FLIGHT

The AIRCRAFT ENGINEER & AIRSHIPS

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- **May 18** .... **Martlesham Heath Reunion Dinner (Connaught Rooms, 7 p.m.)**
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EDITORIAL COMMENT

Are we going too fast?

AT the annual dinner of the A.I.D. Technical Staff Association, Mr. C. R. Fairey referred to the subject of flying crashes, complaining that much publicity was given to these by the daily press, but very little to the greatly increased mileage per accident, and less still to the fact that flying is getting safer every day, while the proportion of crashes due to material failures is, as Mr. Fairey very rightly pointed out, "microscopic." In point of fact, the technique of aircraft design and construction has now reached a very advanced position. So much so, that it is beginning to be questionable whether the technical side has not out-distanced the personal. What we have in mind is this: Machines are being produced with greater and greater horse-power and higher and higher performance. While we would be the last to claim that higher performance *necessarily* means a machine more difficult to handle, it is scarcely to be denied that by its very nature, its great speed and enormous power excess, the high-performance aircraft, although very possibly not demanding greater skill in some respects, does place in the hands of a pilot the possibility of carrying out with comparative ease certain evolutions which a smaller power excess would prevent him from even attempting. It is at any rate a possibility that this very fact may in itself constitute a danger.

Owing to the system in force in connection with service accidents, details of the causes of these, and of the findings of the official investigations are not available to the general public, and so it is almost impossible to obtain accurate information or compile statistics which might throw light on the subject. The Air Ministry will, of course, be in possession of these, but as we have said the public at large is not. It would be interesting to know, for instance, what percentage, during, say, the last two years, of crashes happened to modern high-performance single-seaters, what percentage on older and slower types. It may be, of course, that statistics show that the question of type has little or no bearing on the

proportion of accidents, but if the reverse should be the case, it would seem to indicate that the personal element rather than technical problems may, in the future, put a limit to the extent to which it will pay to go.

We are not putting this suggestion forward in any critical spirit at all. Peace-time flying must of necessity be a larger percentage of war-time risks than is peace-time service in the Navy and Army. But if it is found that already, to express it colloquially, the modern high-performance machine is proving " too much " for the *average* pilot, how much more so would not that be the case in time of war, when the urgent need for pilots would necessitate short and intensive periods of training.

Putting it in a different way, it appears to us at least possible to argue that there may be such a thing as striving after too high a performance unless one can be assured that, should the need arise, it will be possible to find the personnel capable of handling the latest types of machine available by that time. Doubtless the Air Staff is thoroughly alive to this subject, which must in fact constitute a serious problem, or rather series of problems. First of all, our aircraft must have a performance equal to if not better than that of any possible adversary. But if we continue at the rate at which we have been progressing during the last few years, the potential supply of pilots may be inadequate to our needs. Fortunately, from a national point of view, exactly the same arguments would apply in all other countries, and this fact may ultimately supply the answer to the riddle.

The Alluring Atlantic

In his series of extremely interesting articles in the *Daily Telegraph*, Maj. Fitzmaurice discusses, on April 24, the subject of future *commercial* services across the Atlantic, and expresses the opinion that such services will certainly be established. " Commercial services are certain to come " is the way he expresses it, and in his view it will be the multi-engined flying-boat which will be used for such services, these boats being imagined as " flying submarines," capable of riding out the roughest sea. Maj. Fitzmaurice points to improved aircraft, engines, and instruments as the stepping-stones by which the transatlantic services will be made possible.

As firm believers in the future of the flying-boat, we have read Maj. Fitzmaurice's articles with the greatest interest and with much sympathy, and we agree entirely with him in the possibility of so improving the machines themselves, their engines and their instruments and other equipment, that a flight across the Atlantic will become reasonably *safe*, but that is still a long way from saying that they can be made *commercial*. To us it seems that Maj. Fitzmaurice is slightly confusing these two things.

So long as the fuel for the power plant of the aircraft is to be carried on board—and it will have to be so carried unless and until we learn to transmit it efficiently by wireless—even a very great improvement in aircraft engines, improvements far beyond anything which there is any present justification for expecting, will not render possible a *commercial* service over such distances. Even supposing, for the sake of argument, that some day we shall reduce the fuel consumption to one-half of the present—in itself a very great achievement—the useful or *paying* load would still be relatively small. The most economic stages at present are of but a few hundred miles. Any increase in fuel economy would merely extend the economic stage by a certain fairly small percentage; it would not begin to bring it up to that represented by an Atlantic crossing.

An American inventor, Mr. Edward R. Armstrong, has designed a curious craft for refuelling, etc., which he calls a " seadrome," consisting of a platform or aerodrome mounted on a girder-work of tall pillars which terminate at their lower ends in cylindrical floats or buoyancy chambers which supply the necessary displacement. Being spread about, with a fairly free passage of the waves in between them, and owing to the fact that the buoys are not only submerged but permitted to sink a considerable distance below the surface, Mr. Armstrong claims that such a " seadrome," riding to its anchor, would remain steady and unaffected by the highest waves ever recorded. Model tests appear to bear out his contention. Mr. Armstrong imagines eight such seadromes stationed at intervals across the Atlantic, and estimates the capital cost of the entire equipment of such a series of stations at $25,000,000 (about £5,000,000 sterling).

The scheme is ambitious, not to say fantastic, but unless something of the sort materialises, we are afraid we cannot agree with Maj. Fitzmaurice as to the probability of *commercial* Atlantic services being operated by heavier-than-air craft. Developments in sight, if not actually achieved, will render possible a reasonably *safe* crossing by air. Beyond that we do not think one is justified in extending one's claims for the present.

The Night Bomber

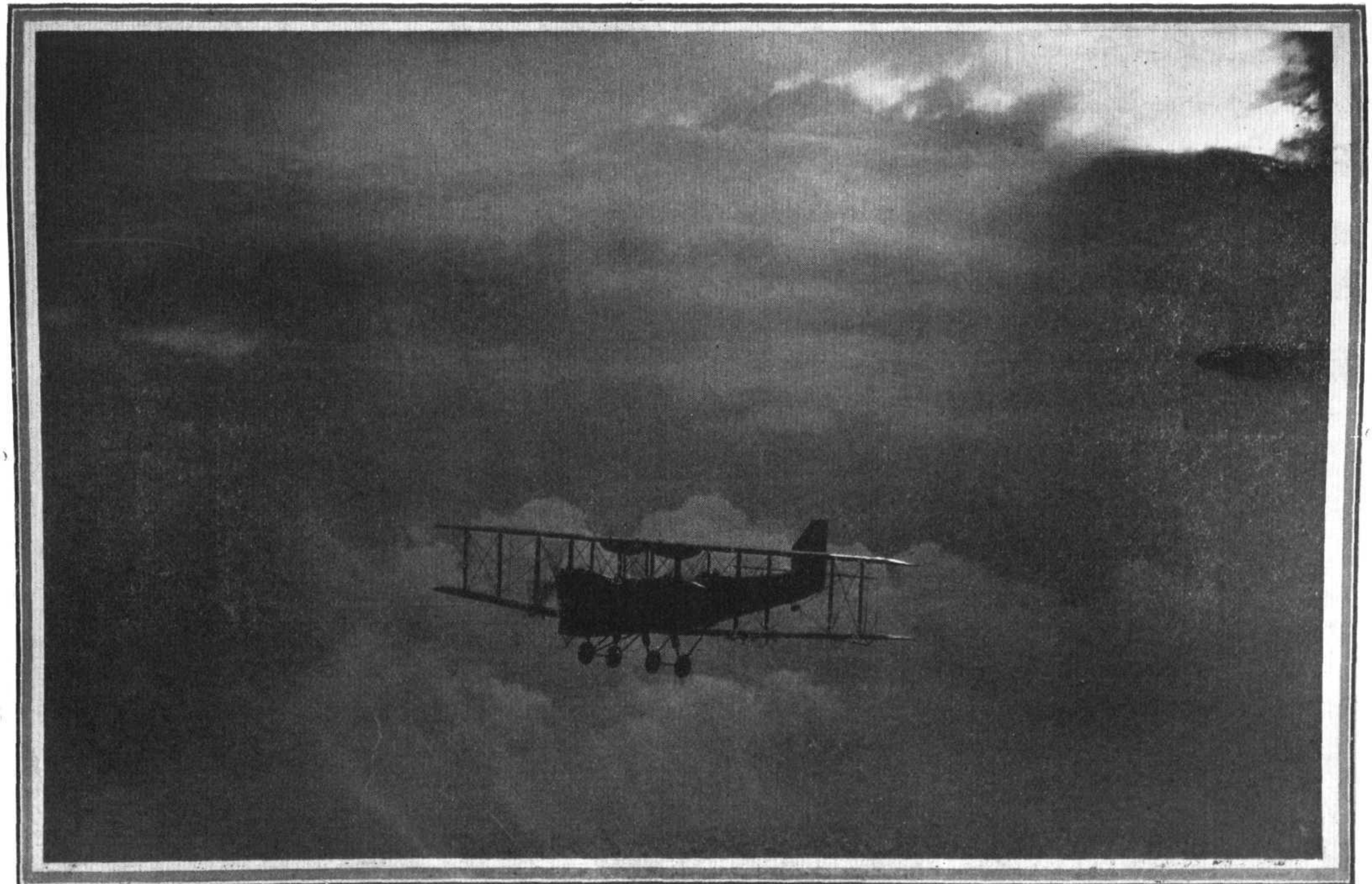
THE photograph on p. 279 shows a Handley-Page " Hinaidi " fitted with two Bristol " Jupiter " geared engines, and was taken from a Handley Page " Hyderabad," fitted with automatic wing tip slots and Napier " Lion " engines, during a test flight in which the automatic slots proved themselves as effective on this very large machine as they have on the little de Havilland " Cirrus-Moth."

Royal Tournament, 1928

THE Royal Tournament, which opens at Olympia on May 24, will have this year as its cardinal feature a number of great ceremonial displays. Apart from the guard-mounting by the Navy, Army and Air Force for the reception of Royal visitors, the ceremonial features of the Tournament will be undertaken by the Brigade of Guards, the Royal Scots Greys—newly home from India—the Duke of York's School, and the Royal Air Force in one of their marvellous drill displays for which they have become famous, and the 1st Batt. Royal Scots Fusiliers in a historical display. The training side of the programme will be equally attractive and will show the work of the Equitation School at Weedon. The Royal Horse Artillery in a Musical Drive, the Royal Army Service Corps in team work, jumping for the King's Cup and the Prince of Wales's Cup, the Inter-port Field Gun Competition by the Royal Navy and the Royal Marines, Modern Gymnastics by the Army School of Physical Training, riding by the 17/21st Lancers, and Skill-at-Arms Championships. The Tournament runs until June 9.

The Speed Record

FLIGHT-LIEUT. DAVID D'ARCY A. GREIG, D.F.C., has been appointed to command the High-speed Flying Section of the R.A.F. at Felixstowe. He will start training immediately, and will probably attempt a speed record on the Supermarine-Napier S.5 in a few months' time. He is at present Examining Officer in Flying to the Fighting Area of the Air Defences. In 1918 he joined the R.A.F. as cadet, and received a commission the same year. During the war he served three months in France, and was awarded the D.F.C. in 1921 for distinguished services with No. 6 Squadron in Iraq.



["FLIGHT" Photograph

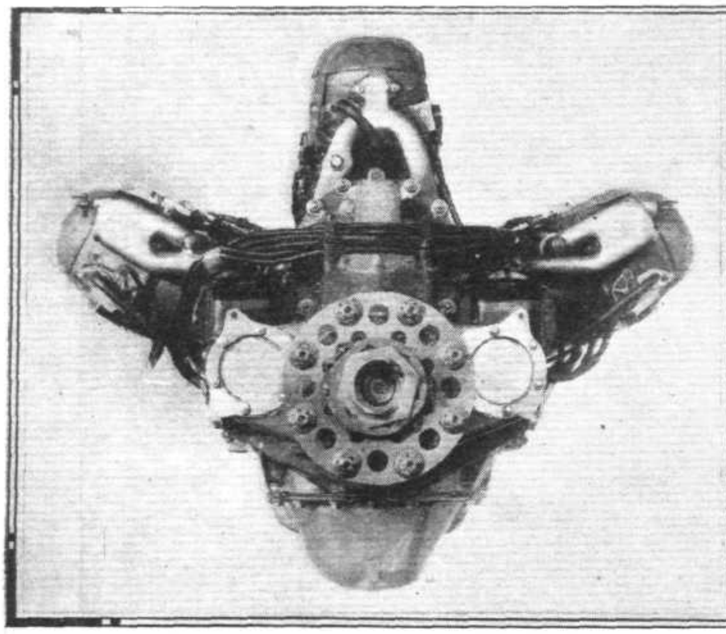
THE NIGHT BOMBER

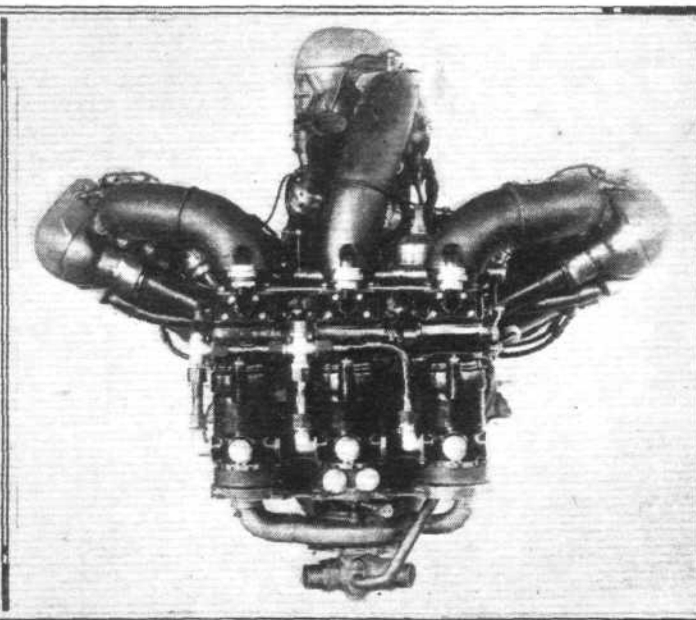
THE NAPIER "LION" RACING ENGINE

875 B.H.P. for a Weight of 930 lbs.

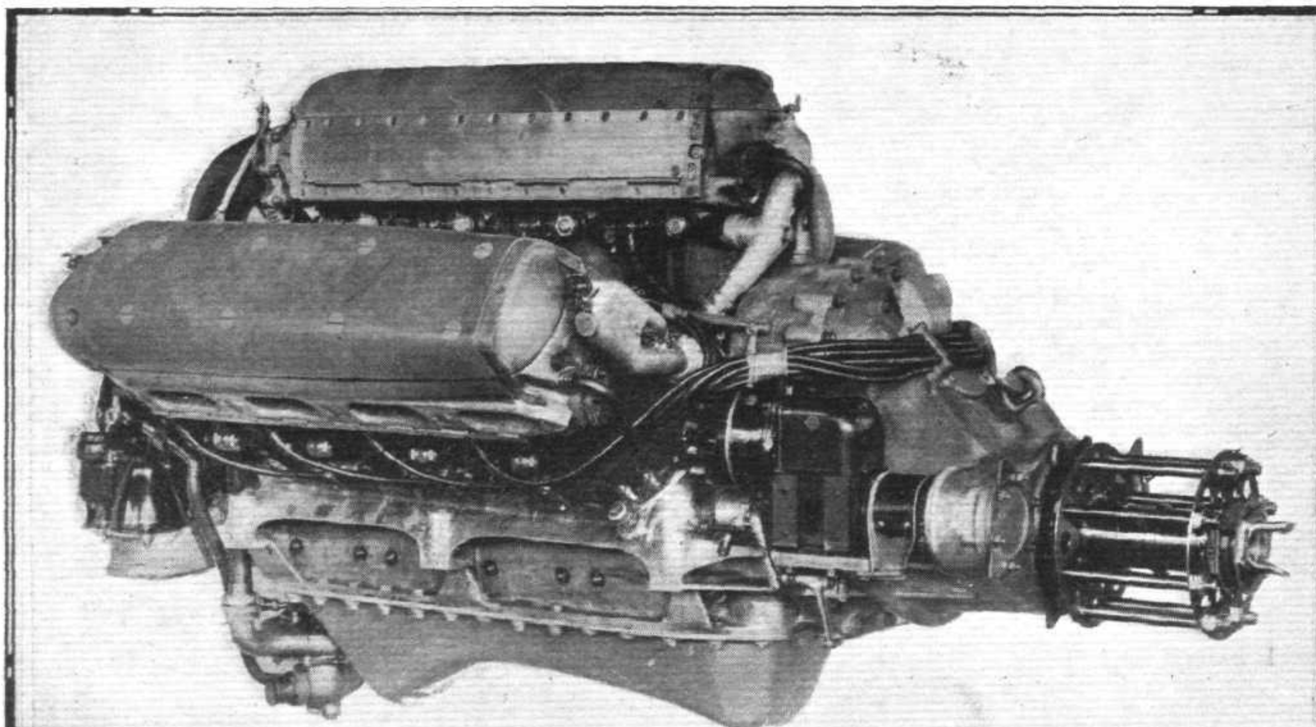
IN our issue of February 16, 1928, we published the first detailed illustrated description of the Supermarine-Napier S.5 monoplane, which won the Schneider Trophy race at Venice last year, and on March 1, 1928, we gave a similar description of the Gloster IV Schneider Trophy biplane. To complete the "story," we are now giving an account of the evolution of the Napier "Lion" racing engine which was fitted on both these machines, and the 1927 version of which attained the astonishing power of 875 b.h.p. for a weight of only 930 lbs. dry.

One of our graphs shows the manner in which the power of the "Lion" racing engine has increased from 1919 to the present time. In the aerial Derby of 1919 the maximum power taken from the engine was 485 b.h.p. at 2,100 r.p.m., the compression ratio being 5·3 to 1. In the Aerial Derby of 1921 the maximum power had grown to 525 b.h.p. at 2,200 r.p.m., with a compression ratio of 5·5 to 1. Two years later, in the Derby of 1923, 560 b.h.p. were taken from the engine, at a speed of 2,380 r.p.m., and with a compression ratio of 6·5 to 1. The following year, 1924, saw the beginning of the series of racing engines produced for the Schneider Trophy Race, and the first engine of these had the distinction of passing the 600 mark, developing 615 b.h.p. at 2,600 r.p.m., and with a compression ratio raised to 7·0 to 1. In 1925 the power had gone up to 680 b.h.p. at 2,600 r.p.m., compression ratio 8·0 to 1, and, finally, last year, an enormous

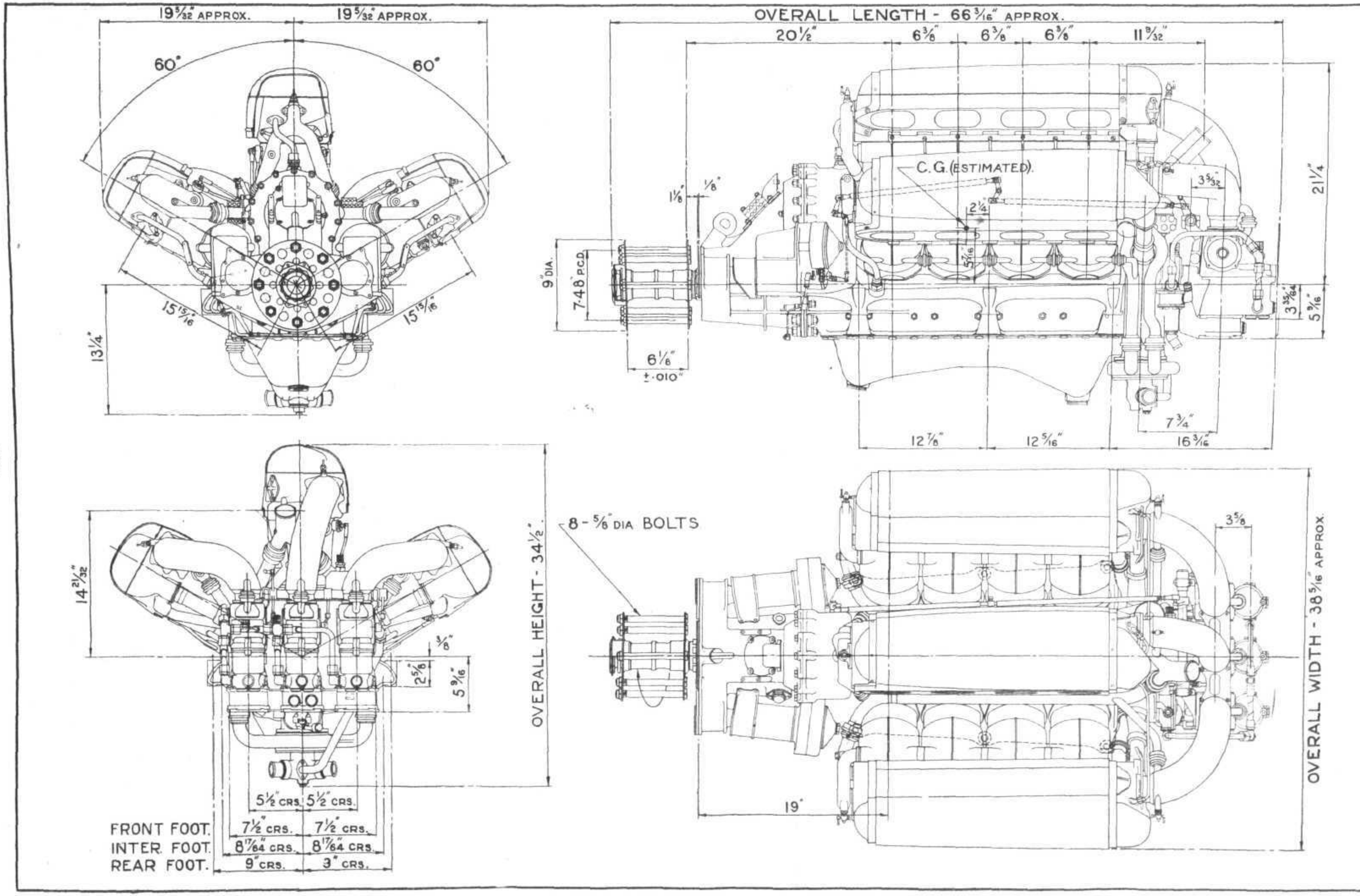




THE NAPIER RACING ENGINE: Front and rear end views. Note how spaces between cylinder banks have been kept free so as to enable the cowling to be brought in close to the cylinders.

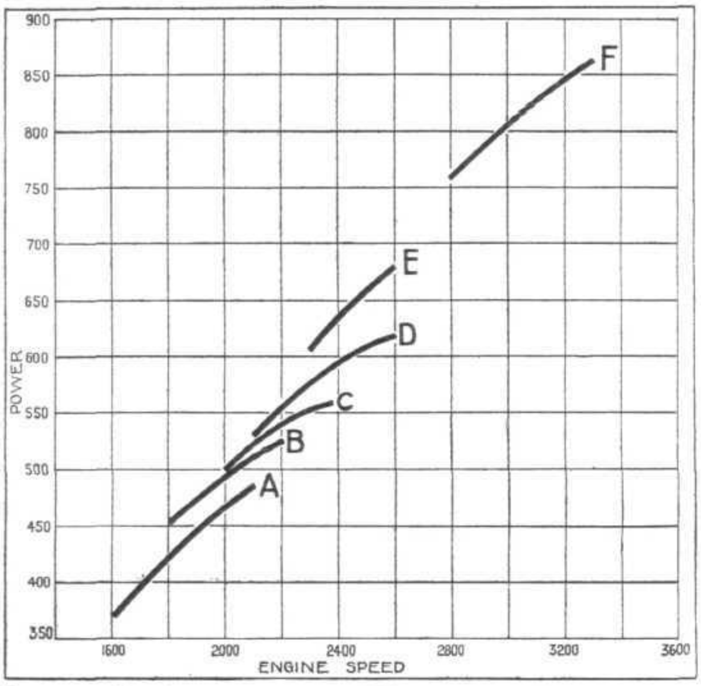


THE NAPIER RACING ENGINE: Three-quarter front view. The magnetos on the front are placed in a fore and aft direction to enable them to be tucked away neatly.



THE NAPIER "LION" RACING ENGINE: These installation diagrams give an excellent indication of the small dimensions to which the engine has been reduced in spite of its 875 b.h.p.

jump was made, to 875 b.h.p. at 3,300 r.p.m., and compression ratio of 10·0 to 1. This, in bare figures, represents the progress made by Napiers in the design of racing aero engines. Splendid as that progress was, however, it is not the only progress, and it is even doubtful whether the power increase which was attained is mainly responsible for the great increase in speed which each of these three "Schneider years" witnessed. Apart from improvements in the



Power and yet more power: These curves illustrate the evolution of the Napier "Lion" Racing engine. A is the curve of the 1919 Aerial Derby engine. Compression ratio 5·3 to 1. B is the 1921 Aerial Derby engine; compression ratio 5·5 to 1. C, the 1923 Aerial Derby engine, had a compression of 6·5 to 1. D, E, and F are the Schneider Trophy engines of 1924, 1925, and 1927, and had compression ratios of 7·0, 8·0, and 10·0 to 1 respectively.

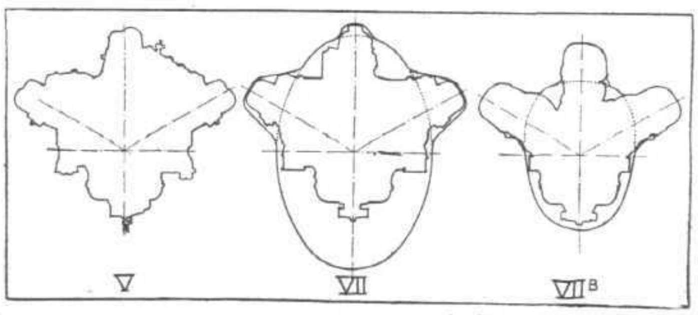
machines themselves, improvements, that is, in features not directly influenced by the engine, a very large gain in speed was a result of the reduction in frontal area of the engine which accompanied the gain in power.

Three end elevations published on this page give a very good idea of the manner in which frontal area, was reduced. On the left is the cross section of the "Lion V." In the centre the type VII racing engine, which already represented a considerable reduction, and, finally, on the right, the 1927 engine, in which the area is reduced to a very small figure indeed, mainly by "clearing" the space between cylinder blocks, but also to a considerable extent by reducing the height of the cylinder blocks themselves. It is not easy to assess with any degree of accuracy the gain in speed which this reduction in area made possible, but there can be no doubt that it was a very large percentage. Strictly speaking, one should include, in any such estimate, the radiator drag, and the introduction of wing surface radiators was responsible for a further substantial increase in speed.

In his series of articles on "Aircraft Performance" in THE AIRCRAFT ENGINEER (Technical Monthly Supplement to FLIGHT), Mr. J. D. North gave (March 31, 1927) a set of curves of equal "potential propeller efficiency" for different values of $K = n\sqrt{\text{b.h.p.}}$, where n was given as revolutions per minute, and, as K is a large number, $K/10^3$ is used. In the case of the 1927 "Lion VII B" racing engine, the maximum b.h.p. is 875 at 3,300 r.p.m., but the gear ratio of 0·765 to 1 reduces the propeller speed to 2,525 r.p.m., which gives $K/10^3 = 74{\cdot}8$. We mention this as a matter of interest rather than because this particular case affords any real comparison, since, as pointed out by Mr. North, he was basing his comparisons on forward velocity for engines with increasing power, whereas the high forward speeds of the Schneider machines naturally resulted in making this high value of K less detrimental than it would be in a slower machine.

Turning now to a more detailed examination of the steps in the evolution of the Napier "Lion" racing engine as it exists to-day, we find that Captain G. S. Wilkinson, Napier's chief designer, and those associated with him, formed the opinion that a substantial reduction in frontal area, or, in other words, in drag, was likely to give a greater increase in speed than could any feasible "boosting" in power, unaccompanied by such a reduction. How thoroughly the subject was studied will be realised when it is pointed out that a sort of "ideal" fuselage was designed and a scale model made, both the model and its lines being illustrated by diagrams and photographs in this article. In designing this "ideal" fuselage no attempt was made to take into account such problems as belonged more properly to the province of the aircraft designer. For instance, the questions of fuselage strength in relation to engine mounting, the possibility or otherwise of installing tanks, instruments, &c., and similar problems, were not considered. But the "ideal" fuselage was kept as small and as "clean" as the size of a normal pilot would permit, and it was established as primary conditions that the new engine *must* fit into it with as little interference as possible.

From the start it was obvious that the cylinder blocks of the "Broad Arrow" type of engine would of necessity have to project beyond the shape of the fuselage; this meant that the spaces between the cylinder banks must be left free of obstructions in order that the engine cowling might smoothly cover them. Moreover, it was considered desirable to reduce the depth of the cylinder banks themselves. To do so without changing the bore and stroke of the engine (which are the same as those of the standard "Lion") involved a very considerable re-designing not only of the cylinder blocks, but of the connecting rods and pistons. The former had to be shortened, which obviously gave greater angularity and heavier wear on the pistons, but as the engine was not to be called upon for the long periods of running which the normal "Lion" successfully negotiates, this was regarded as being permissible. In drawing the cylinder blocks farther inwards, the opportunity was taken at the same time to raise the compression, which was increased from the 8·0 to 1 of the previous engine to 10·0 to 1. This was made possible by employing a special fuel mixture consisting of 25 per cent. benzol, 75 per cent. petrol, to which was added 0·22 per cent. of T.E.L. dope. In addition to the reduction in height of the cylinder banks, these were made with a smooth exterior as regards the valve covers at the outer ends, which were so shaped that no cowling would be necessary there. This feature is clearly visible in some of our photographs. Moreover, the cylinder blocks were provided with means for attaching the cowling between the blocks, and for attaching streamline fairings in front of and behind the blocks. This naturally facilitated the aircraft designer's task of producing a simple and "clean" cowling.

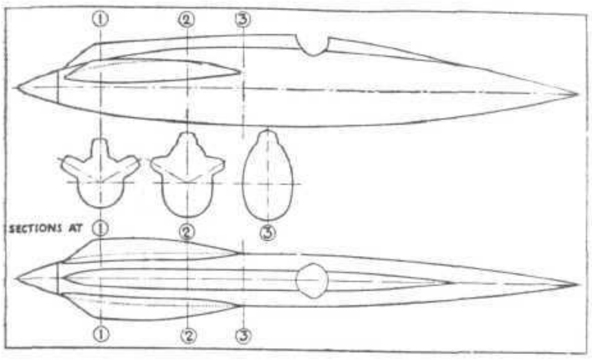


Progressive steps in the evolution of a racing engine: On the left an end view of the standard Napier "Lion V." In the centre, a similar view of the type VII racing engine fitted in the 1925 Gloster III. On the right, an end view of the type VII B of the 1927 Supermarine S.5.

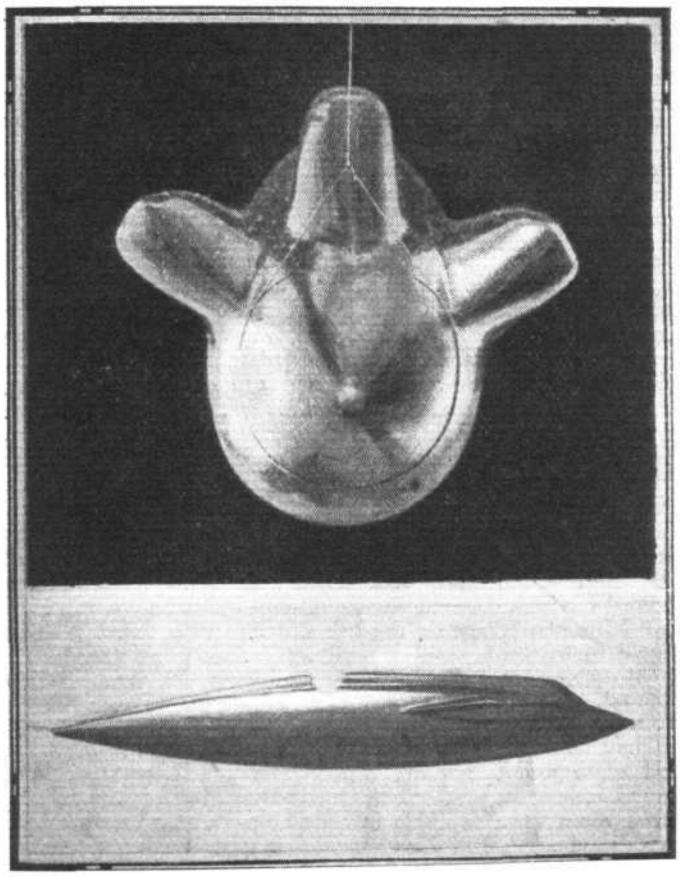
Other "aids to cleanliness" were discovered to be necessary, such as the transference of certain accessories to positions where the smooth lines of the nose of the machine would not be interfered with. For example, the magnetos were removed from the rear of the engine, where they had been mounted with their axes at right angles to the line of flight, thus increasing the width, to the front of the engine where they were placed in a fore-and-aft direction— as shown on our photographs.

The water system was the next item to come in for a searching scrutiny. It is, of course, well known that normally a water system is so designed as to enable it to function on the thermo-syphon principle when the engine is idling at low speeds and when, in consequence, the water pump is ineffective. The inlet is at the lowest point of the system and the outlet at the highest. This would, however, in this case mean

exposed water pipes, and a series of experiments were carried out to determine whether the water system could be made to function with the outlet pipes taken down along the bottom of the vees between the cylinder banks, where they could be neatly faired-in. It was found that such a system would work satisfactorily, at least for conditions such as would



Lines of a scale model made to study the fairing and streamlining of the Napier Racing Engine.



THE NAPIER RACING ENGINE: Two views of a model made to determine the reduction in frontal area which ought to be aimed at.

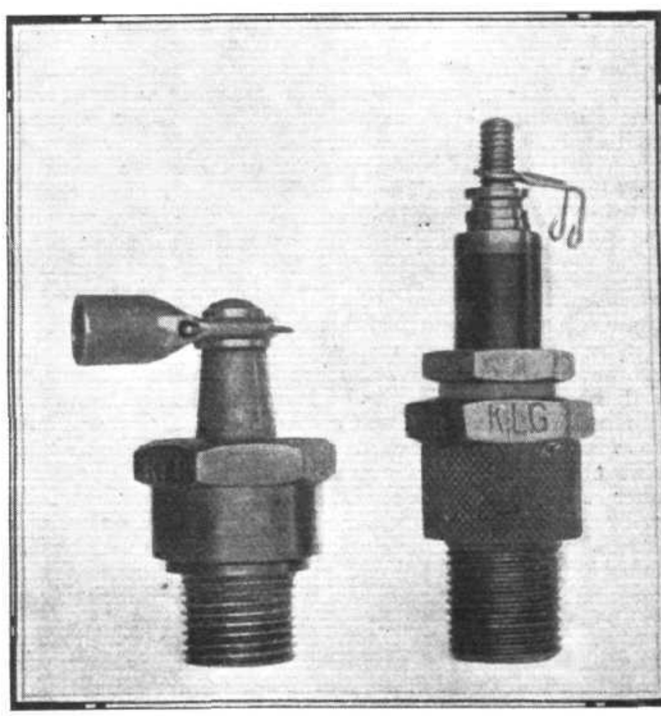
obtain in the Schneider Trophy race. The experiments were continued to include the effect of tilt, *i.e.*, representing angles of ascent and descent of the machine during flight, and still no serious trouble was encountered. The water system was therefore designed so as to incorporate this arrangement of the pipes.

The only other feature of the engine design which seriously affected the drag was the reduction gear for the airscrew. Originally it was decided that for the high forward speeds contemplated, direct-drive airscrews would give sufficient efficiency without going into the extra weight and complication of gearing, and the manufacture of the racing engines was commenced on this supposition. Later on, as a result of further experiment, it was decided that better results should be obtained with geared airscrews, and it was decided to produce both ungeared and geared engines. By this time, however, the machines themselves had been built, and it was essential that any gear produced by Napiers should be of a type which did not interfere with the smooth exterior of the nose. This ruled out the normal type of Napier reduction gear, and a new type had to be evolved, which could be placed inside the fairing of the centre cylinder block. The new gear produced was therefore of the double-reduction type, with the layshaft placed above the airscrew shaft, the latter being co-axial with the crankshaft and running in the same direction The crankshaft gear wheel has 28 teeth and the primary wheel on the layshaft 32, giving a reduction of 0·875; the secondary wheel on the layshaft has 28 teeth, and that on the propeller shaft 32, giving yet another reduction of 0·875, which brings the overall reduction to 0·765.

Mention has already been made of the fact that in the 1927 engine the compression ratio was increased to 10. At the same time, tests were made with a view to ascertaining how far extra power might be obtained by running the engine at higher speed. Apart from questions of propeller efficiency, there were obviously limits beyond which, for various reasons, it would not be safe to go. Ultimately it was decided, as a result of exhaustive tests, that in the actual race a maximum of 3,300 r.p.m. might be used, giving an output of 875 b.h.p., or more correctly an input to the propeller of that amount. It will be realised that there were difficulties to be overcome. We can refer to a very few of these only. For example, as is well known the volume of air consumed by an engine varies approximately as the power output. Before, therefore, such very high power could be taken from the engine, the valve gear and induction systems required very considerable study, and a certain amount of re-designing to enable the engine to inhale and exhale nearly double the usual volume of air.

The higher speeds and compression ratio caused much higher bearing loads and stresses in the moving parts. These problems were successfully dealt with, in spite of the reduction of weight which was made simultaneously.

The increase in speed and compression ratio imposed great strain on the ignition system, for instance, and a number of special sparking plugs were made and tested before a really satisfactory one was evolved. This is shown in one of our photographs. The high pressures and temperatures called for good jointing between the various components of the plugs, and the small insulating surfaces called for careful design, not only in the plug itself, but in the design of the engine, as well as great care in the choice of fuel to avoid deposits and electrical leakage. For instance, a high benzol content was found to give carbon deposit on the plugs during idling. To avoid this, experiments were made with T.E.L. 44 per cent. dope. This avoided the carbon deposit, but although it gave fairly good results, it was found to have a tendency to deposit lead on the plugs during idling. Ultimately the mixture previously referred to was selected and, as it afterwards proved, with entire success. The special K.L.G. plugs evolved were much shorter than the normal type so as to avoid bulges on the cylinder block cowlings, and their overall height was further reduced by a special type of cable



The Plug Problem: On the right the standard K.L.G. Plug, and on the left the special plug produced for the Napier Racing Engine.

terminal. The Watford magnetos were made specially light in weight, and capable of running at very high speed, the makers rendering very valuable assistance in carrying out research on apparatus capable of standing up to the high duties demanded.

A number of other features of the Napier racing engine might be mentioned, but sufficient has probably been said to indicate to what very large extent the excellent performances put up were due to engine improvements. As to future developments, we must " wait and see." We hope that after the 1929 Schneider Trophy race we may be in a position to record that the Napier engines for that race were as far ahead of the 1927 model as that was in advance of the previous type. At the moment it is by no means easy to see how that may be brought about, but we have not the slightest doubt that it *will* be done.

The above notes are based mainly upon information supplied to us direct, but to a certain small extent also on the paper read before the R.Ae.S. and I.Ae.E. by Captain Wilkinson, to whom, consequently, we make due acknowledgment.

Specification of the Napier " Lion " Racing engine :

Compression ratio	10 to 1.
Length o.a.	5 ft. $6\frac{1}{4}$ in.
Width	3 ft. $2\frac{1}{4}$ in.
Height	2 ft. $10\frac{1}{2}$ in.
Normal power	800 b.h.p.
Maximum power	875 b.h.p.
Maximum speed	3,300 r.p.m.
Total weight	930 lbs.
Fuel consumption	50 gallons/hour.
Oil consumption	3 gallons/hour.
Gear reduction ratio	0·765

GERMAN-IRISH ATLANTIC FLIGHT

PRESUMABLY owing to the limited means of communication available at Greenly Island some confusion has arisen as to the position of the German-Irish Atlantic airmen since they landed after flying the Atlantic on April 12-13. The position is that Capt. Koehl and Baron Von Huenefeld have remained on Greenly Island with the damaged " Bremen " ever since their landing, and their Irish companion, Major Fitzmaurice, has meanwhile flown to Murray Bay in a relief machine to arrange for the repair of the " Bremen," which had bent its propeller tip and broken the axle. On the Sunday, April 15, after the landing, Mr. Duke Schiller, a well-known Canadian pilot, got through to Greenly Island on a Fairchild monoplane with Dr. Louis Cuisinier and a mechanic, and he took off with Major Fitzmaurice for Murray Bay the following day. A forced landing was necessary on the way at a place called Natashquan. On continuing the next day a gale forced another landing, at Clarke City, and on the third day, April 18, they reached Murray Bay and met Miss Junkers, to whom the " Bremen's " requirements were made known.

On April 23, Major Fitzmaurice returned to Greenly Island in a machine with Mr. Bert Balchen as chief pilot, a Junkers mechanic and a newspaper representative. They carried food, spare parts for the " Bremen," and cigars, etc. Mr. Floyd Bennett was to have piloted the machine, but he was suddenly threatened with pneumonia and had to enter a Quebec hospital. He and Mr. Balchen are to accompany Commander Richard Byrd on the coming Antarctic flight. The machine used for the relief of the " Bremen " crew is a Ford product and it was flown to Murray Bay from Detroit.

New York has been frantically waiting the Atlantic airmen, and there has been some rivalry between the Irish element and German element in the city, engendered by the different nationalities of the crew and the desire to avoid one party predominating in the welcome. The trouble apparently began by the erroneous reports which indicated that Major Fitzmaurice had left Greenly Island in the relief 'plane to reach New York and Washington first. The Major naturally repudiated such a suggestion and explained that he was chosen to leave the island because the Germans could not speak English very well, and his sole object was to arrange for the transport of spare parts. He did not go any farther south than Murray Bay.

Providing that the " Bremen " can be repaired on the island the three airmen will fly on to New York together. It is reported that the two Germans intend flying back to Europe. The wives of Major Fitzmaurice and Capt. Koehl have left on the same boat for New York to greet their husbands. Ireland immediately recognised the bravery of its Air Force Commandant by promoting him to Major. The flight was his second attempt on the Atlantic.

It is worth noticing that the coating of the wings with paraffin oil to avoid ice collecting was very effective on the ocean flight. Little by little details of a more authentic nature have come through, and it is clear that they were exceedingly lucky. The chief dangers threatened them when roughly 500 miles from the coast of Newfoundland. They encountered a strong south-easterly wind there and became enveloped in a great fog area. On descending to find a clear passage, a raging ocean and mountainous waves forced them to rise again and fly by compass and instruments alone ; but later the stars were seen and they flew west for two hours. A low descent brought to view a wooded hill, and they knew they were safely across the ocean at last. At dawn could be traced the wilds of Labrador, and the course was altered south-east. A broad river was seen, but no landmark recognised, and they became concerned about the diminishing petrol supply. After two more hours of uncertainty a landing became urgent, and then to their relief the lighthouse on Greenly Island was sighted, although it was first thought to be a ship. The noise of the descent brought welcome evidence of life on the island as they wondered if the place was uninhabited. A good landing seemed likely on the ice until suddenly the ice gave way, and the " Bremen " put its nose down abruptly, causing Capt. Koehl to bang his head severely.

On stepping out of the machine, $36\frac{1}{2}$ hours after leaving Ireland, the Baron fell through the ice and was rescued from his unenviable position by the Major.

They received a welcome hospitality from the inhabitants and have found comfort during the subsequent enforced imprisonment on the island. Their experience has naturally given them theories as to the probable fate of the previous expeditions.

The National Benzole Co., Ltd., state that their benzole was used on this Atlantic flight.

Supermarine Dramatic Society

THE Supermarine Dramatic Society presented their first production at the Chantry Hall, Southampton, on April 13 and 14, with some considerable success. The piece selected was the well-known farcical comedy " Are You a Mason ? " and each performance reflected the highest credit upon everyone concerned. Not only did the actors render their parts with confidence and competence, but the production and stage management was well carried through. The scenery, it may be mentioned, was entirely constructed and painted by members of the society. It would seem that the Supermarine Dramatic Society has a brilliant future before it.

The Royal Air Force Memorial Fund

THE usual meeting of the Grants Sub-Committee of the fund was held at Iddesleigh House on April 19. Mr. W. S. Field was in the chair, and the other members of the committee present were Mrs. L. M. K. Pratt-Barlow, O.B.E., Sqdn.-Ldr. Douglas Iron, O.B.E. The committee considered in all nine cases, and made grants to the amount of £140 4*s*. The next meeting was fixed for May 3, at 2.30 p.m.

Martlesham Heath Reunion Dinner

THE Martlesham Heath Reunion Dinner, which was unfortunately allowed to lapse a few years ago, is being revived and is to be held on Friday, May 18 next, at the Connaught Rooms, Great Queen Street, London, W.C.2, at 7 p.m. for 7.30 p.m. (Dinner jackets). Will any officer who served at Martlesham during 1917 to 1922 and is desirous of attending send cheque for 15*s*. to E. C. Stringer, Carlton House, Regent Street, London, S.W.1.

Bernardi's Speed Record

IT may be of interest to note that Major de Bernardi's Fiat-Macchi seaplane, on which he beat his own previous world's speed record with an average of 318·3 m.p.h., was fitted with a Marelli magneto, type M.F.12. This successful magneto, by the way, is supplied in this country by Marelli Magnetos (England) Ltd., of 17, Wells Street, Oxford Street, London, W.1.

THE BRISTOL "JUPITER" VIII PASSES 100 HOURS' TEST

THE 100-hour official bench test on the Jupiter VIII engine, carried out in accordance with the British Air Ministry requirements, was successfully completed in last month, the engine being officially rated at 440 h.p. at 5,000 ft.

The tests, in accordance with the following synopsis, were carried out on the Froude Dynamometer, and officially observed by the Inspectors of the British Aeronautical Inspection Directorate. The engine maintained its power throughout the test, the full throttle brake horse-power developed at the end of the 100 hours being within 1 per cent. of that developed at the commencement of the test.

After the completion of the test the engine was stripped down and officially inspected; the general condition was excellent, there being a complete absence of measurable wear on the reduction gear components, while the average wear on the major components of the engine was, as shown in the accompanying officially signed chart, remarkably low, being only a fraction of the wear permissible before replacements are required.

In order to cover the Series IX and XI engines, which differ only in compression ratio, a supplementary run of one hour at 540 b.h.p. and 2,200 engine r.p.m. was carried out on the 5·3 compression engine; this was carried through with complete success, the engine stripping in perfect condition.

The synopsis of the test schedule is as follows:—

Preliminary Power Curve 1½ *Hours*.—Carried out at full throttle from 1,600 to 2,200 engine r.p.m.

Endurance Test 100 *Hours*.—Carried out at 2,000 engine r.p.m., and at the 90 per cent. equivalent ground rating, in 10- and 15-hour non-stop runs. The final hour engine ran at full rated power.

High Speed Test 1 *Hour*.—Carried out at 2,310 engine r.p.m., or 5 per cent. in excess of the maximum permissible r.p.m.

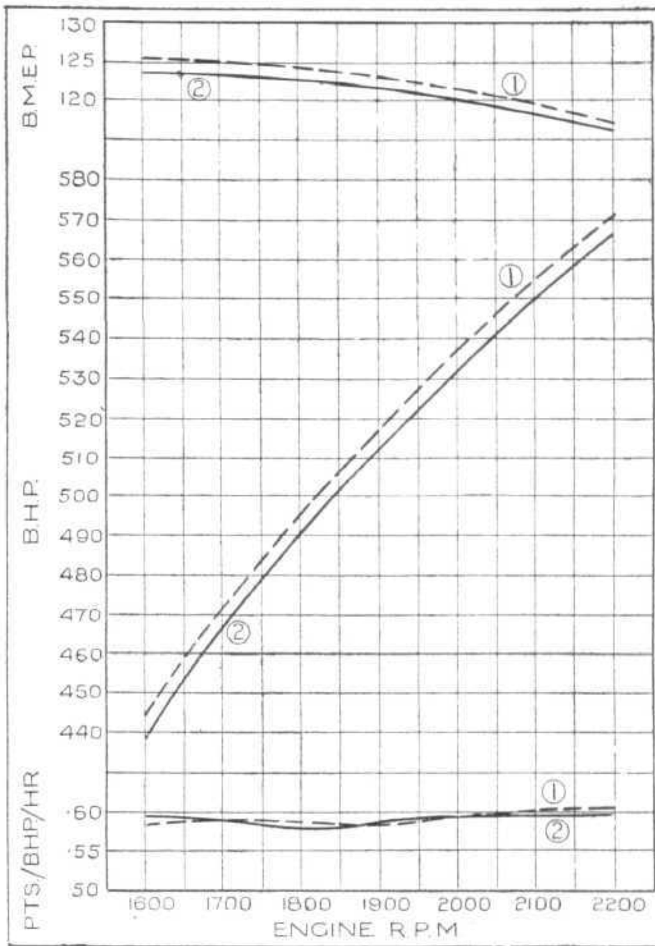
Slow-running and Acceleration 10 *Mins*.—Sustained running at 440 engine r.p.m. and accelerations up to normal r.p.m.

High Power Test 1 *Hour*.—Carried out at maximum permissible r.p.m. and at 6 per cent. in excess of rated power.

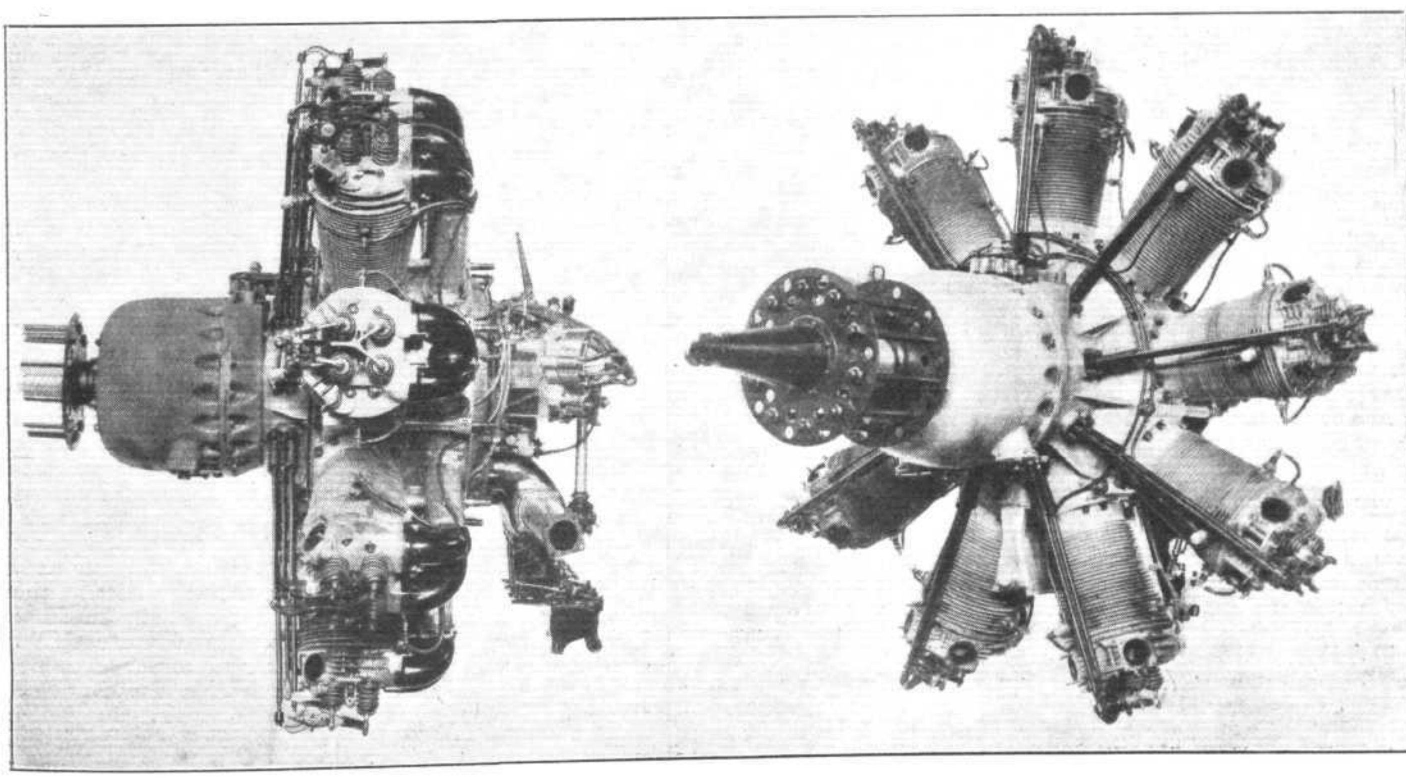
Final Power Curve 1½ *Hours*.—Carried out at full throttle from 1,600 to 2,200 engine r.p.m.

Fuel and Oil Consumptions.—The average consumptions for the 100-hours' endurance test at 90 per cent. power were: fuel, 27½ gallons per hour; oil, 10 pints per hour.

Wear on major components during the test is given in the following table:—



Power Curves (full throttle) of Bristol "Jupiter VIII" J.8014 for 100-hour Air Ministry Test.



Two views of the Bristol "Jupiter" Series VIII geared engine, which has just successfully passed through the Air Ministry 100-hours' Type Test.

Air Ministry 100 Hours' Test; Schedule of wear on Bristol "Jupiter" Series VIII engine

Component.	Wear during test.
Cylinder bore	0·001
Piston	0·0012
Gudgeon pin diameter	0·0012
Small end bush bore	0·0011
Wrist pin diameter	0·0004
Wrist pin bush bore	0·001
Crankpin diameter	0·0005
Big end bush bore	0·0007
Big end bush outside diameter	0·0015
Master rod liner bore	Nil
Cam sleeve bush bore	0·0005
Crankshaft sleeve	Nil
Eccentric gear bore	0·001
Eccentric floating bush of diameter	Nil
Eccentric floating bush bore	0·0005
Eccentric outside diameter	0·0005
Crankshaft tail bearing	0·0005
Reduction gear pinion bush	Nil
Reduction gear shaft	Nil
Propeller shaft tail end	Nil
Propeller shaft tail end bush	Nil

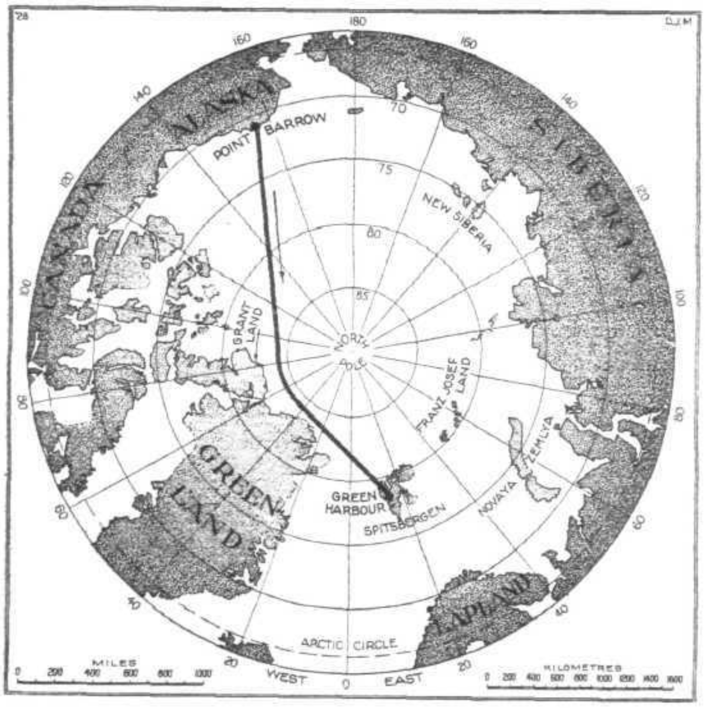
The general condition of the engine (J. 8014) at the completion of the test was excellent, and as shown in the above table the average wear on the major components was remarkably low.

◈ ◈ ◈ ◈

THE FLIGHT ACROSS THE ARCTIC

CAPTAIN G. H. WILKINS and Lieutenant Carl B. Eielson left Point Barrow, Alaska, on Sunday, April 15, and covered 2,200 miles above the Arctic circle to Green Harbour, Spitsbergen, in about 20 hours. The machine they flew was a Lockheed "Vega" monoplane fitted with a 220 h.p. Wright "Whirlwind" engine.

The major part of the journey was flown over an area so far unknown to man. At the start from Point Barrow there was trouble in getting away, and ultimately it was found necessary to transport the machine some miles, where a more suitable runway was arranged, enabling a start for the great flight to be made on April 15, a week later than expected.



ACROSS THE ARCTIC BY AIR: Our sketch map traces the course taken by Capt. G. H. Wilkins and Lieut. C. Eielson during their twenty-hour flight over the Great Circle on April 15-16. Over 2,000 miles were flown non-stop, indicating again the reliability of the Wright "Whirlwind" 220 h.p. engine.

Visibility was good for the first section of the journey, but later the explorers had to vary their course until they once more struck clear atmospheric conditions, when careful watch was kept for any signs of so far unknown lands. But nothing in this direction was noted, and as beforehand arranged, they informed their friends in America, after the landing at Green Harbour, by radiogram from Svalbard, to Dr. Isaiah Bowman, Director of the American Geographical Society, the scientific sponsors of the flight, to the effect in the following message :—"Traversed course outlines one. Account bad weather. Arrived 20½ hours. Flying time, five days from Barrow. No foxes seen."

In explanation of this message it had previously been decided that if mountainous land was seen, Capt. Wilkins would cable that he had seen black foxes; if level land then blue foxes; while if able to obtain an approximate extent of the land he would designate it in hundreds of square miles by the number of foxes, with an estimate of the position following the word fox or foxes.

The reference to the "course outlines one" meant that he did not pass directly over the North Pole. After leaving Point Barrow Capt. Wilkins planned to swing to the right on crossing the Arctic Ocean through the area known as the "blind spot" in the Arctic, on the chance of finding there hitherto undiscovered land.

At times the explorers' flying height ranged up to 6,000 ft. or more. It was some thirteen hours after the take-off that they had a view of Greenland Mountains, and this was the point at which their real voyage of "discovery" practically ended, although having close upon 1,000 miles still to cover before landing at their pre-arranged destination.

Greenland, which was sighted on the horizon a few hours after passing Grant Land, foreshadowed bad weather ahead. At that point the course must have been some 300 miles from the North Pole. Later, before they reached Spitzbergen, the explorers made a safe landing on firm ice at the spot described in the telegram to their backers as Dead Man's Is. Owing to the fearful weather, five days were spent on this inhospitable ice-bound island, but with improved conditions they then decided to attempt the final stage of the flight, and after various "adventures" in getting away, the explorers were soon heartened by "sighting" Green Harbour, where they received a warm welcome—in more senses than one—so their venture was for the time happily ended; the length of their sojourn at Spitzbergen being determined by the arrival of a ship capable of bringing them and their monoplane back to more civilised quarters.

Captain G. H. Wilkins, M.C. (and bar), is an Australian who has led a life of adventure. His boyhood was spent in the saddle, sheep-mustering and boundary riding. Educated at a State school, he later studied electrical engineering at Adelaide and familiarised himself with photography. He learnt to fly in 1910, and went through the Balkan war of 1912–13 as a photographic correspondent with the Turkish forces. He then joined an expedition to the Arctic, received a commission in 1917 in the Australian Flying Corps, and was later appointed official photographer to the A.I.F. After the war he was one of the competitors for the £10,000 offered by the Commonwealth Government for the England-Australian flight which was won by the late Sir Ross Smith and his brother Sir Keith Smith. Subsequently he joined other expeditions and made observations by air in the Arctic regions in 1926 and 1927, mainly as a preliminary to this recent Arctic flight.

Capt. Wilkins' chief pilot, Lieut. Carl Eielson, flew successfully over Government mail routes in Alaska, which earned for him a message of congratulation from President Coolidge.

Sir Charles Close, the President of the Royal Geographical Society, made reference to the flight across the Arctic at a meeting of the Society at the Æolian Hall, when he read the following telegram, which, he said, had been sent by direction of the council to Capt. Wilkins, who is a Fellow of the Society:

"The Council of the Royal Geographical Society warmly congratulate you and Eielson on the remarkable feat of navigation and airmanship over the unexplored Arctic."

The High Commissioner for Australia (Sir Granville Ryrie) sent a telegram to Capt. Wilkins conveying the warmest congratulations of the Australian community in London to him and to Lieut. Eielson, and also transmitted a telegram of congratulation from the Royal Aeronautical Society on "another great Australian triumph."

The AIRCRAFT ENGINEER

FLIGHT ENGINEERING SECTION

Edited by C. M. POULSEN

April 26, 1928

CONTENTS

EDITORIAL VIEWS

We are beginning to move at last. In this issue will be found a brief summary of R. & M. No. 1072, which deals with the profile drags of wing sections R.A.F. 15, 25, 26, 27, 28, 30, 31, 32, 33, 34 and American M.2. With the modern conception of aerofoil theory, it is very much more convenient for the aircraft designer to tabulate, or plot graphically, the characteristics of aerofoils for infinite aspect ratio, treating induced drag separately and without reference to profile drag.

R. & M. 1072 gives the formulæ for calculating total k_D and α for the aspect ratio chosen from the infinite span values of k_{Do} and α_o. Introduced are the coefficients M and N, which are $1+\tau$ and $1+\delta$ respectively from Glauert's book. Another innovation is that pitching moments are given about a point $0{\cdot}25$ of the chord back from the leading edge, a practice which has been in use in other countries for some considerable time. No reference is made in R. & M. 1072 to the possibility of obtaining k_{Do} graphically, although this is a good deal simpler. Possibly this is due to the fact that a somewhat peculiar style of plotting the profile drag, &c., has been chosen. The graphs illustrating the R. & M. have k_L as their base, with k_{Do} scale on one side and α_o scale on the other, the $k_{m(\cdot 25)}$ being a downward continuation of the vertical scale. Why there should be in this country such a dislike of the polar diagram we have never been able to understand. It is used in practically all other countries and does undoubtedly give a much better "picture" of what happens. The polar plotting, with k_L plotted against k_D, enables one to draw in the induced drag curve for the aspect ratio of the model test, and it is then a simple matter to obtain k_{Do} by subtracting k_{Di} from k_D of the model test.

However, this is a very minor point. We are glad that at last the profile drags of a certain number of aerofoils are available direct, and it is to be hoped that any future aerofoil test results will be so given, since these are what the designer desires to keep filed away for use, the induced drag having, in any case, whatever the section used, to be calculated for each new machine, or rather wing arrangement, span-loading, and so forth. And the old-fashioned method of re-calculating for one aspect ratio from another aspect ratio was very cumbersome.

THE PROBLEM OF AERODYNAMIC INTERFERENCE.

By STANLEY H. EVANS, A.F.R.Ae.S., M.I.Ae.E.

Wing-Body Interference: Biplane Fighters

(*Continued from p.* 6.)

In the previous article we have put forward the argument that a progressive decrement in incident or "wash-out" towards the centre portion of the wing may be desirable in an effort to obtain coincident burbling over each element of the wing span and so retard the well-recognised phenomenon, common to rectangular aerofoils, of initial stalling at the centre. Possibly the solution is not quite so simple as this, for the claim may be open to criticism on other grounds, remembering that most of the model tests have been carried out on wings without the body in place, and, more vital still, without slipstream effects, though the latter will not affect the maximum lift under normal landing conditions with engine off. There appears to be very little conclusive evidence available, but some full-scale work already accomplished in America would point to a most erratic distribution of lift within the slipstream influence.* Although this particular piece of research work is presented to the designer in an admirably convincing fashion by the aid of three-dimension relief models of the pressure contours, the paucity of further data for comparison with other wing arrangements must forbid any serious conclusions at present. Another recent American pressure investigation† is very interesting in this connection, but, as this is a model test for an isolated biplane with tapered wings, certain of the conclusions put forward may be a little invalidated with a fair-sized body bridging the gap. It may be observed, however, that, whereas burbling over the top centre portion is strongly marked at 18° incidence, the bottom wing maintains a uniform distribution up to 24°, finally stalling at the exceptional angle of 27°, a result which suggests that an optimum biplane combination has not been obtained.

Passing from these considerations of maximum lift, we are on firmer ground when studying the interference problem in relation to the air flow at the wing and body junction. It has been suggested earlier that the usual centre section, when braced parasol to the body, may be a potent source of interaction between wing and body, and might, therefore, be dispensed with by joining the top wing directly to the body. This practice is not uncommon for small biplanes, where the body is often deep enough to bridge the normal

* Amer. N.A.C.A., T.R. No. 193: Pressure Distribution over the Wings of an "MB-3" Airplane in Flight. (Norton.)

† Amer. N.A.C.A., T.R. No. 271: Pressure Distribution Tests on "PW-9" Wing Models showing Effects of Biplane Interference. (Fairbanks.)

TABLE 1.—(A) *Conventional Single-Bay Biplane: Parasitic Drag Synthesis.*

(Ref. Fig. 11A)

Component.	Frontal Area (ft².)	Drag Coefficient (abs.)	Paras. Drag (lb. at) (100 ft.s.)
Total: Body...	10·5	0·20	50·0
Wheels: Standard aero, 700 × 100	1·8	0·15	6·4
Struts: Front oleo and rear radius.	2·0	0·07	3·3
Wires: $\frac{5}{16}$-in. streamline... ...	0·09	0·20	0·4
Wiring lugs and hinge joints ...	(6 at 0·1 lb. each)		0·6
Axle: 2-in. faired tube	1·1	0·06	1·6
Total: Undercarriage ...	...	...	12·3
Tail plane and elevators — Based on surface area	26·0	0·005	3·1
Fin and rudder — Based on surface area	12·0	0·004	1·1
Wires: 2 B.A. streamline ...	0·11	0·20	0·5
Wiring lugs	(16 at 0·05 each)		0·8
Tail skid	—	(approx.)	1·2
Total: Tail	...	...	6·7
Centre-section struts: Front and rear.	0·5	0·06	0·7
Centre-section wires: Front, rear, and side.	0·13	0·20	0·6
Interplane struts: Front and rear	1·5	0·04	1·4
Incidence wires: $\frac{1}{4}$-in. streamline	0·13	0·20	0·6
Lift wires: $\frac{3}{8}$-in. streamline ...	0·45	0·20	2·2
Anti-lift wires: $\frac{1}{4}$-in. streamline	0·19	0·20	0·9
Wiring lugs	(16 at 0·1 lb. each)		1·6
Total: Wing bracing ...	...	...	8·0
Total: Miscellaneous fittings	...	(approx.)	3·0
Total: Free air drag ...	...	...	80·0
Interference drag factor ...	+ 25 per cent.		20·0
Total: Parasitic drag ...	...	...	100·0

Explanatory Notes.

Total machine weight: 2,600 lb. Engine: 400-500 h.p. radial.

Body: Rectangular frame, faired by contour stringers. Frontal area based on maximum cross-section of body. Drag coefficient includes body complete with radial cylinders, windscreen, cockpit opening, etc.

Undercarriage: Floating type with external oleo legs and standard aero-wheels. Unfaired hinge connections to body and axle.

Tail: Wire braced type, top and bottom to two spars.

Wing bracing: Single-bay truss with parasol centre-section. Panel (strut-cum-wire) type centre-section and interplane struts.

Miscellaneous fittings: Includes external petrol piping, wing tank sumps, and various external accessories.

Interference factor: Based on model and flight-test data.

wing gap, but it cannot always be claimed as satisfactory from the pilot's viewpoint when bearing in mind the equally important problem of a clear forward view; often enough a good upward view is obtained only by sacrifice of reasonable landing requirements.

Figs. 7–9 illustrate proposals for biplane fighters, keeping these two features, of smooth air flow and clear view, well to the fore as primary design conditions. Fig. 7 is a single-bay design, Fig. 8 a minor structural development of the same arrangement, and Fig. 9 a two-bay machine with divided chassis and a minimum of parasitic structure within the

TABLE 2.—(B): "*Clear-View*" *Single-Bay Biplane: Parasitic Drag Synthesis*

(Ref. Figs. 7 and 11–B)

Component	Frontal Area (ft.²)	Drag Coefficient (abs.)	Paras. Drag (lb. at) (100 ft.s.)
Total: Body	10·0	0·18	42·8
Wheels: Internally sprung, 700 × 100	2·0	0·12	5·7
Struts: Front and rear	1·7	0·06	2·4
Wires: $\frac{5}{16}$-in. streamline... ...	0·09	0·20	0·4
Wiring lugs	(4 at 0·05 lb. each)		0·2
Axle: Aerofoil section (Surf. area)	10·0	0·005	1·2
Total: Undercarriage ...	...	...	9·9
Tail plane and elevators — Based on surface area	26·0	0·005	3·1
Fin and rudder — Based on surface area	12·0	0·004	1·1
Struts	0·33	0·06	0·5
Tail skid	—	(approx.)	1·0
Total: Tail	...	...	5·7
Centre-Section Struts: "V" type	0·75	0·06	1·1
Interplane Struts: "V" type ...	2·2	0·04	2·1
Lift wires: $\frac{3}{8}$-in. streamline ...	0·45	0·20	2·1
Anti-lift wires: $\frac{1}{4}$-in. streamline	0·17	0·20	0·8
Wiring lugs...	(12 at 0·05 lb. each)		0·6
Total: Wing bracing ...	...	...	6·7
Total: Miscellaneous fittings	...	(approx.)	2·0
Total: Free air drag ...	...	...	67·1
Interference drag factor ...	+ 20 per cent.		13·4
Total: parasitic drag ...	...	...	80·5

Explanatory Notes

Total machine weight: 2,600 lbs. Engine: 400–500 h.p. radial.

Body: Oval-section monocoque with extended (integral) wing roots. Frontal area based on maximum cross-section of body. Drag coefficient includes body complete with radial cylinders, windscreen, cockpit opening, etc.

Undercarriage: Rigid type with internally-sprung wheels. Faired connections at bottom wing roots and wheel shields.

Tail: Semi-cantilever type, single bottom struts only.

Wing bracing: Single-bay truss with "Clear-view" centre-section. "V" type centre-section and interplane struts.

Miscellaneous fittings: Includes various external accessories.

Interference factor: Based on model data.

airscrew disc. The undercarriage in each case incorporates internally sprung wheels and a rigid frame, faired at all connections—a subject to which we shall devote a few remarks in a later chapter. Fig. 11 has been drawn to compare the frontal aspect of the "clear-view" designs of Figs. 7 and 9 against a single-bay fighter on more orthodox lines, the respective drags being synthesised under Tables 1 to 3, and summarised in Table 4 for statistical comparison, along with the slipstream drags. Thus, in column (A), Table 4, the first sub-column indicates parasitic drag within the slipstream, the second sub-column showing the total parasitic drags (*i.e.*, both inside and outside the slipstream), as derived from Table 1. As all these figures are based on a machine of the same total weight and similar type of radial engine, the aerodynamic advantage of the "clear-view" arrangement is well brought out, the parasitic drag being reduced to about 77 to 80 per cent. of the conventional type. The corresponding effect upon performance will be discussed under Part II of these articles.

Actually as they stand, there is little to choose, in total

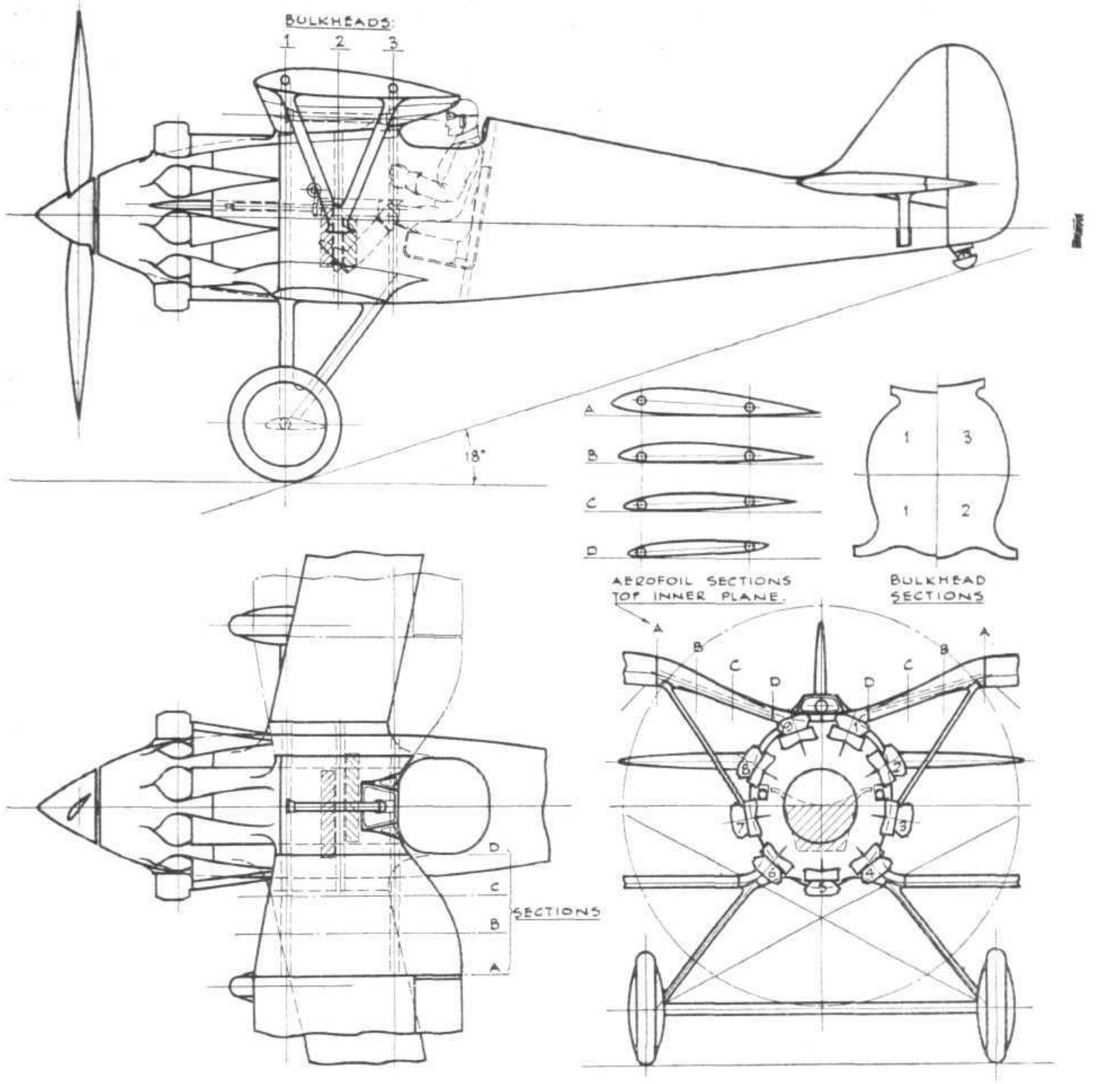

BULKHEADS:
1 2 3
18°
A
B
C
D
AEROFOIL SECTIONS TOP INNER PLANE.
BULKHEAD SECTIONS
SECTIONS

FIG. 7

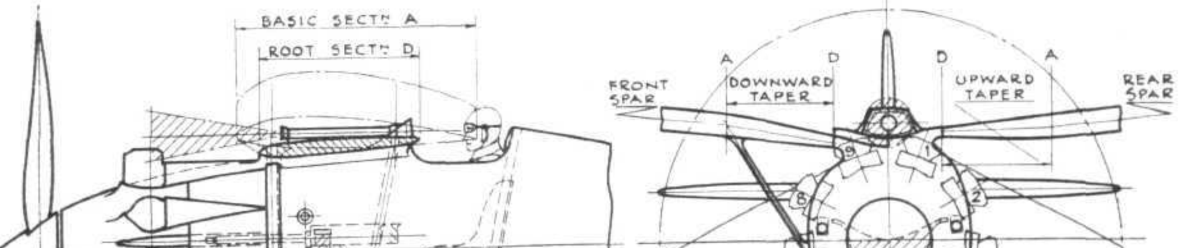

BASIC SECTN A
ROOT SECTN D
FRONT SPAR
DOWNWARD TAPER
UPWARD TAPER
REAR SPAR
18°

FIG. 8

TABLE 3.—(C): "*Clear-View*" *Two-Bay Biplane: Parasitic Drag Synthesis*

(Ref. Figs. 9 and 11–C)

Component	Frontal Area (ft.^{2})	Drag Coefficient (abs.)	Paras. Drag (lb. at) (100 ft.s.)
Total: Body	10·0	0·18	42·8
Wheels: Internally sprung, 700 × 100	2·0	0·12	5·7
Vertical struts: (Wing)	0·5	0·06	0·7
Diagonal struts: (Body) ...	0·7	0·06	1·0
Axle: (divided, as above) ...	—	—	Nil
Total: Undercarriage ...	...	...	7·4
Tail plane and elevators } Based on surface area	26·0	0·0055	3·4
Fin and rudder } Based on surface area	12·0	0·0045	1·3
Bracing: (Cantilever)	—	—	Nil
Tail skid	—	(approx.)	1·0
Total: Tail	...	...	5·7
Inner interplane struts: "I" type	0·72	0·04	0·7
Outer interplane struts: "I" type	0·60	0·04	0·6
Inner lift wires: $\frac{7}{16}$-in. streamline	0·18	0·20	0·9
Outer lift wires: $\frac{5}{16}$-in. streamline	0·26	0·20	1·2
Inner anti-lift wires: $\frac{1}{4}$-in. streamline	0·10	0·20	0·5
Outer anti-lift wires: $\frac{1}{4}$-in. streamline	0·19	0·20	0·9
Wiring lugs	(24 at 0·05 lb. each)		1·2
Total: Wing bracing ...	...	...	6·0
Total: Miscellaneous fittings	...	(approx.)	2·0
Total: Free air drag ...	...	...	63·9
Interference drag factor ...	+ 20 per cent.		12·8
Total: Parasitic drag ...	...	...	76·7

Explanatory Notes

Total machine weight: 2,600 lb. Engine: 400–500 h.p. radial.

Body: Oval-section monocoque with extended (integral) wing roots. Frontal area based on maximum cross-section of body. Drag coefficient includes body complete with radial cylinders, windscreen, cockpit opening, etc.

Undercarriage: Rigid type with internally-sprung wheels and divided chassis. Faired connections at bottom wings and wheel shields.

Tail: Full-cantilever type, no external bracing.

Wing bracing: Two-bay truss with "Clear-View" centre-section. "I"-type interplane struts.

Miscellaneous Fittings: Includes various external accessories.

Interference Factor: Assessed from empirical data.

parasitic drag, between Figs. 7 and 9, though contrary to a first impression perhaps, the two-bay truss scores a little from the cleaner structure under body and slipstream influence: for this reason it is important that any comparative model tests should be complete with working airscrew. On the other hand, Fig. 7, could be cleaned up still further at the body connections, by eliminating the top inner planes and constructing each side as a true single-bay truss, without the "V" wing-body struts, as shown. It would mean the sacrifice of the *pronounced* dihedral of the inner sections, though sufficient wash-out and a limited amount of extra dihedral towards the body could be obtained by suitable tapering of the wing spars at their inner extremities. Thus, the front spar would be tapered down and the rear spar tapered up. This would be advantageous in the case of the

TABLE 4.—*Comparative Summary: Parasitic Drag*

Type (A): Conventional single-bay biplane. (Ref.: Table 1, Fig. 11–A.)

Type (B): "Clear-View" single-bay biplane. (Ref.: Table 2, Figs. 7 and 11–B.)

Type (C): "Clear-View" two-bay biplane. (Ref.: Table 3, Figs. 9 and 11–C.)

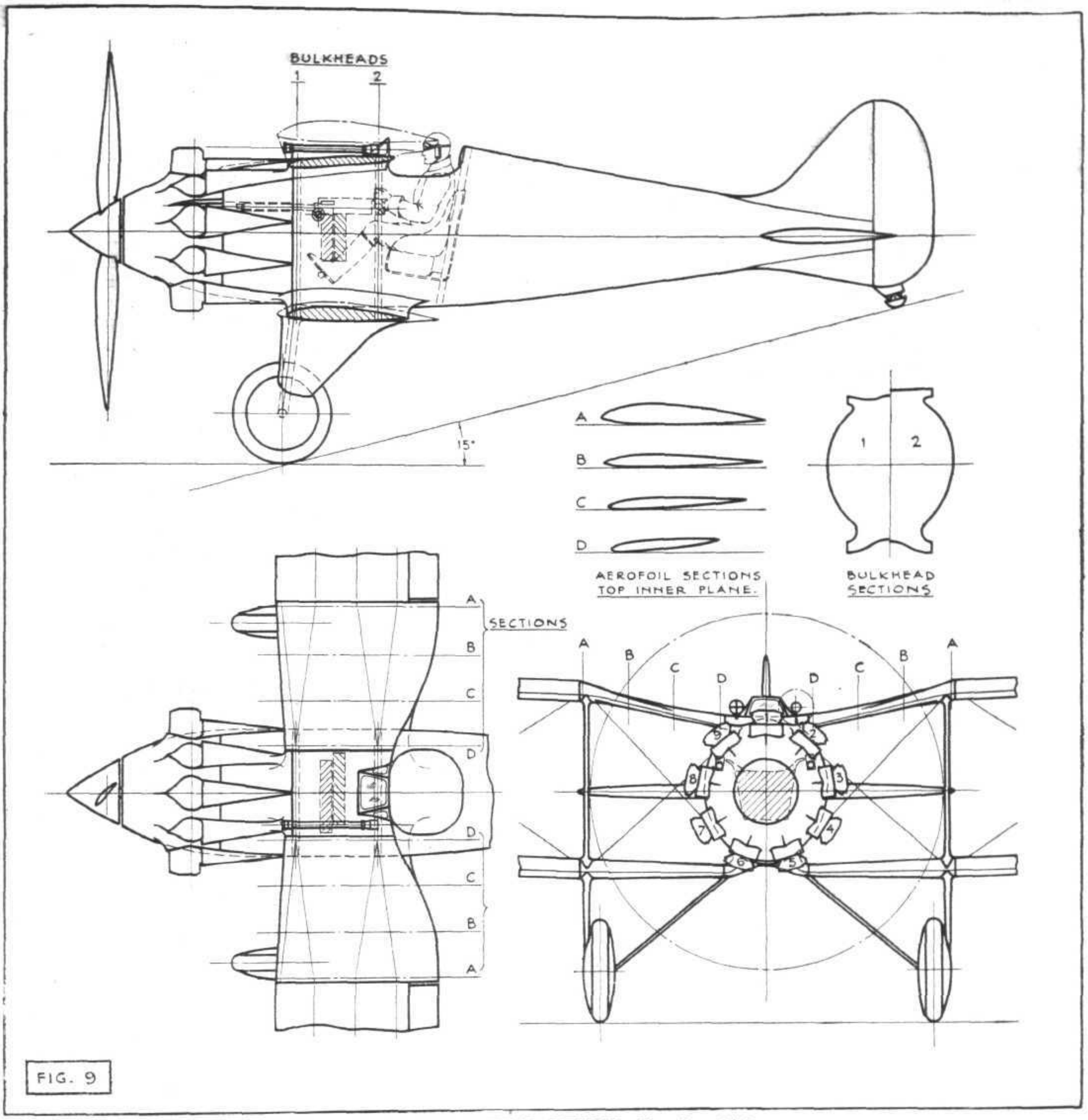
Parasitic drag (lbs. at 100 ft.s.)

Type:	(A)		(B)		(C)	
Group	Slipst. Drag	Total Drag	Slipst. Drag	Total Drag	Slipst. Drag	Total Drag
Body	40·5	50·0	34·2	42·8	34·2	42·8
Undercarriage ...	3·0	12·3	2·0	9·9	0·6	7·4
Tail	6·7	6·7	5·7	5·7	5·7	5·7
Wing bracing ...	2·8	8·0	1·9	6·7	1·8	6·0
Miscellaneous fittings	2·0	3·0	1·0	2·0	1·0	2·0
Total: Free air Drag	55·0	80·0	44·8	67·1	43·3	63·9
Interference drag	13·7	20·0	9·0	13·4	8·7	12·8
Total: Parasitic drag	68·7	100·0	53·8	80·5	52·0	76·7

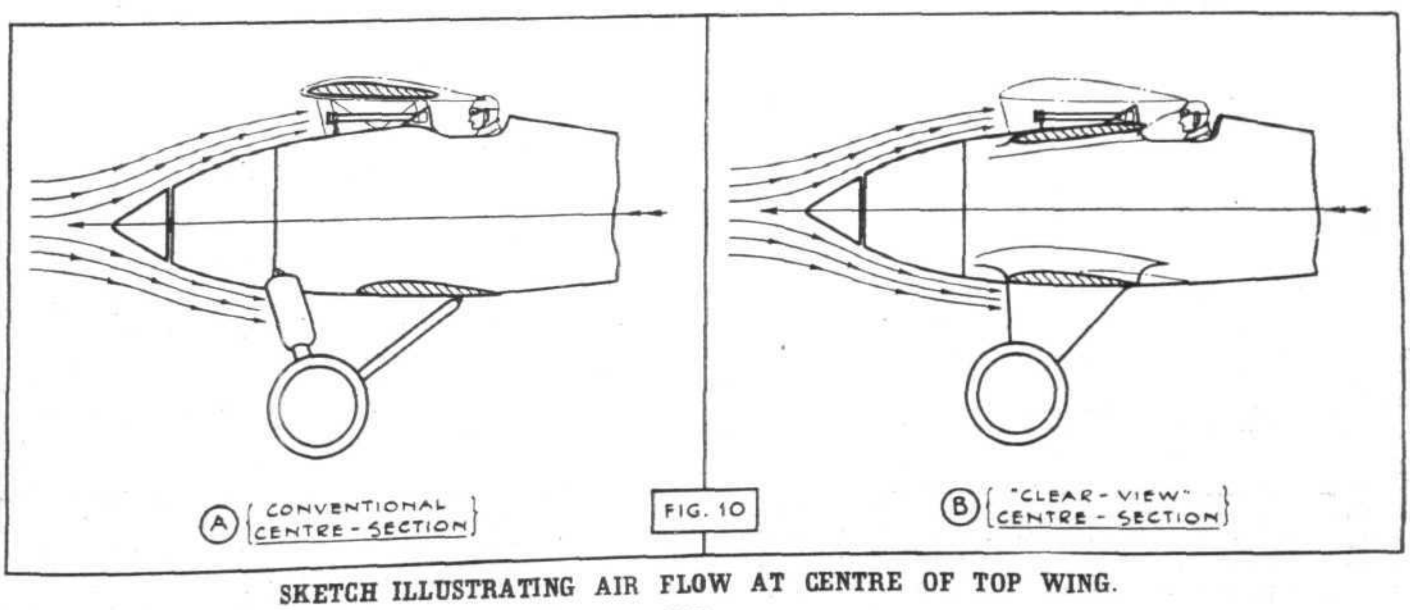
rear spar as the neutral axis would be concave against the lift loading in normal flight and so reduce the total bending moment in the bay. Since this argument would also operate against the corresponding convexity of the front spar, it would be advisable in that case to interpose a single small body strut to support the downward taper, as shown in Fig. 8. Further, in the case of wing fuel tanks for gravity feed, this extra strut has sometimes been found necessary, and could be made to take the fuel supply line from the tank. Naturally, for the reverse loading conditions of inverted flight, the rear spar would be under this same disadvantage, the curvature of the neutral axis adding to the bending moment, though in this case the loads are less and the spar would probably be up to the required factors. Purely from the interference standpoint, Fig. 8 is perhaps the best solution, and in the absence of model data, an Interference Drag Factor of 15–18 per cent. would be a fair assessment, in place of the more usual 25 per cent. for the conventional arrangement of Fig. 11 (A).

Fig. 10 is a sketch suggesting the underlying idea of these proposals, (A) showing the conventional, and (B) the proposed "clear-view" scheme of wing connections. From this it will be apparent that if the pilot's cockpit is situated near the highest point of the body, there will be a general uptrend of the air flow in front of this region for most streamline shaped bodies, this flow being upwards relative to the normal air-stream over the outer portions of the wing, which are sensibly outside the influence of the body streamlines. It is clear then, that if the centre portion of the top plane is to attack this body layer of air at the appropriate incidence common to the whole wing, for any given lift condition, it must be brought gradually into alignment with the upward slope of the body lines where connected or faired into them, and so be inclined at a negative angle or decreased incidence to the outer portions. Such a feature should tend to harmonise the air flow between the wing and body, and thus reduce the mutual interference losses at this region; the upward flow of the body streamlines being progressively changed or "twisted" across the inner portions of the span, to a positive or greater incidence at the outer portions, which are maintained at a uniform incidence as usual, with the possible exception of the overhang where a shaped wing tip may necessitate a certain amount of wash-out towards the extremities.

Incidental to the advantages of smoother air flow, it will be seen that the geometric effect of the twisted wing root is to produce an increased degree of dihedral towards the body, which together with the negative slope of the root section and its grading down in thickness (it need be only about $2\frac{1}{2}$–3 ins. for small fighters), will be of advantage to the pilot's forward vision: allowing an unrestricted fighting view directly ahead along the gun sights, and over the inner portions of the top plane and engine cowling when registering on a target; and



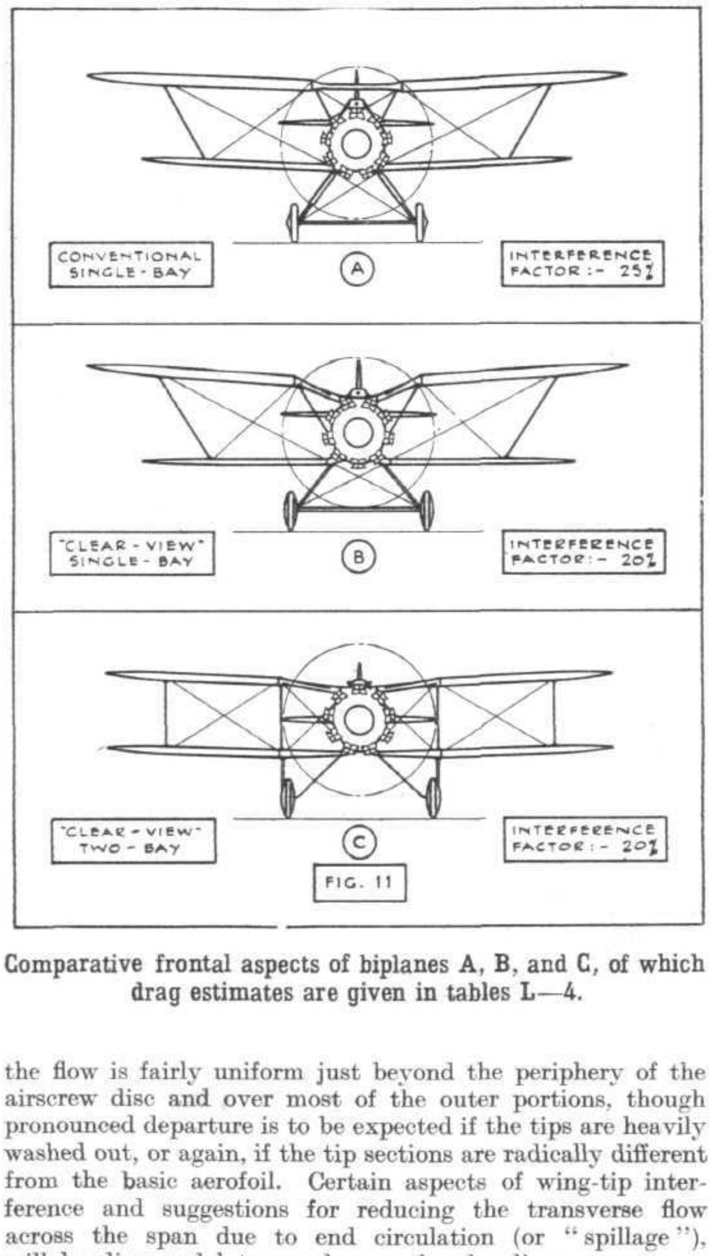
"CLEAR-VIEW" FIGHTER DESIGN : Two-bay biplane.



SKETCH ILLUSTRATING AIR FLOW AT CENTRE OF TOP WING.

also downward and forward beneath the wing when required for landing. It is even conceivable that the inner portions, being beneath the pilot's line of sight when diving on a target, may act as a kind of sighting platform.

A closer inspection of Figs. 7-9 will show that the inner portions of the top plane are decreased—without mutilation of a good aerofoil section—in incidence, thickness, and chord towards the body, the wing-root section being aligned up with the top contour of the body, at the same time taking advantage of any external projections, such as engine cylinders etc., by fairing into them. It is important to maintain good lift-drag sections over this region, which is in the added velocity of the slipstream. The root section is really set near the position of minimum drag to the upward flow over the top of the body, and is then gradually increased in incidence, etc., to meet the normal air-stream at the outer sections, where the influence of the body flow is decreasingly felt as we proceed outward towards the wing tips. Probably



Comparative frontal aspects of biplanes A, B, and C, of which drag estimates are given in tables L—4.

the flow is fairly uniform just beyond the periphery of the airscrew disc and over most of the outer portions, though pronounced departure is to be expected if the tips are heavily washed out, or again, if the tip sections are radically different from the basic aerofoil. Certain aspects of wing-tip interference and suggestions for reducing the transverse flow across the span due to end circulation (or "spillage"), will be discussed later, under another heading.

When formulating any criticism of these proposals, the reader would do well to try and re-arrange his mental picture of the flow conditions at the centre of a wing with a comparatively large body in place, assuming also a single- or two-seater design with the usual rise of body lines towards the windscreen. It must be remembered that angle of incidence has really very little aerodynamic significance, for it is mostly a drawing office and works convention, defining the "tangent chord" as the datum of the section; it is, therefore, only a geometric artifice for design and constructional purposes. Briefly, it is claimed that the progressive decrement in incidence of the inner portions towards the body will enable the wing elements to attack the air at their most appropriate incidence for any given lift condition.

The remaining feature of the pronounced dihedral angle at the body connections requires little further comment. The correct angle is mainly a fine question of apportioning the relative importance of the view over the top, for gun-sighting purposes, and that below the wing for landing, though it is important to avoid sharp angles, as far as possible. It will be apparent, perhaps, that as we increase the dihedral at the body, so do we improve the forward and downward view between the wings, at the expense of the forward and upward view and, possibly, the pressure distribution across the centre portion. Fig. 8, on the other hand, tends toward exaggeration of the upper view, owing to the limited dihedral of the top plane—about 6° throughout the bay. An approximate dihedral of about 10-30° over the inner sections would appear satisfactory, but is best settled by reference to the construction of an actual "mock-up," where this angle can be altered to suit the position of the pilot's eyes. It might be pointed out here that the construction of the inner sections need not be a dearer shop process than the more accepted type of centre section common to most radial-engined fighters. The apparent incidence twist is easily arranged in Figs. 7 and 9, by dropping the dihedral of the leading edge and front spar at a more pronounced angle than the rear spar or trailing edge and then locating the rib sections to suit. When compared with the usual centre section having the trailing edge cut back to the rear spar, there should be no question of any difference in cost, since special ribs are required in both cases.

The designs here submitted assume an oval monocoque body—at least, for the centre portion containing most of the military equipment, although the rear portion aft of the cockpit may be a framed structure, if desired. The writer, personally, believes that the shell body is the obvious solution for economical stowage and accessibility of the military equipment to the best advantage for the pilot's comfort, particularly in handling of the guns. Moreover, there is a slight aerodynamic gain, both in reduced frontal area and drag coefficient for the oval section. The monocoque fuselage in the past has been more popular on the Continent than in this country, but the metal version now appears to be making considerable headway, the Short and Supermarine designs being leaders in this field. For high-speed aircraft the writer's view is that the practice of fairing a square frame and fabric fuselage with dozens of flimsy contour stringers is to be condemned as a thoroughly unsound mechanical proposition, peculiar to aircraft construction in the past, and productive of much unnecessary travail in the drawing office, apart from wasted man-hours in the shops and further trouble under service conditions.

Concerning the interference of the bottom wing and undercarriage at the body, it is not proposed to discuss the former to any length, since the problem of clear view is not nearly so acute as for the top wing. The sesqui-plane arrangement of allocating the major area in a biplane to the top wing, has been increasingly popular in France ever since its introduction about 1913-14, by the Nieuport brothers, and the practice has much to recommend it, both structurally and aerodynamically. By confining the chord and position of the bottom wing, we can improve the downward view and help, to a limited extent, in reducing the interference at the body connection, a position which is already aggravated by the proximity of the undercarriage.

On the other hand, it has been shown by Table 3 that the equal two-bay biplane, developed along B.A.T. "Bantam" lines, has attractive merits of its own. In spite of its inherent instability, the war-time "Bantam" must be admitted an inspired design in many ways, and the type is certainly worth further development in this country. In either case, we can help further to reduce interference at this region, by eliminating sharp angles and introducing the bulkhead type of root fairing seen to advantage on the Gloster "IV," which is a recent excellent example in the right direction. (See Fig. 6, p. 5, January 26, 1928.) Like the top wing, the bottom wing roots will naturally take advantage of any

cylinder or other projections, by fairing into them as far as practicable, especially so in the case of radial engined designs where exposed cylinder heads and valve gear mean a fresh source of body and airscrew interference.

For this latter reason it should be noted that Figs. 7 and 8 have been drawn with a rearrangement of the standard 9-cylinder radial shown by Fig. 9. Thus in the conventional arrangement, now practically standard for this type, No. 1 cylinder is in the top vertical position, whereas Figs. 7 and 8 are designed with a bottom cylinder (No. 5) vertical, thereby improving the forward view over the top of the body and upper pair of cylinders, at the same time allowing the bottom wing roots and undercarriage struts to fair in behind a lower pair of cylinders, which are now more conveniently located for the purpose. In the standard 9-cylinder radial, the position of the top valve gear is undoubtedly an obstruction in the line of the gun sights, and it is up to the machine designer to co-operate with and influence the engine designer along these lines.

(To be continued.)

IN THE DRAWING OFFICE.

A METHOD OF OBTAINING THE VOLUMES OF IRREGULAR SHAPED BODIES.

By W. S. Hollyhock

The following method of obtaining volumes will be found more accurate and less laborious than the more usual method of finite integration and is particularly suitable for the awkward shaped tanks so often encountered in aircraft design.

To work through a particular example will probably be the best way of explaining the method.

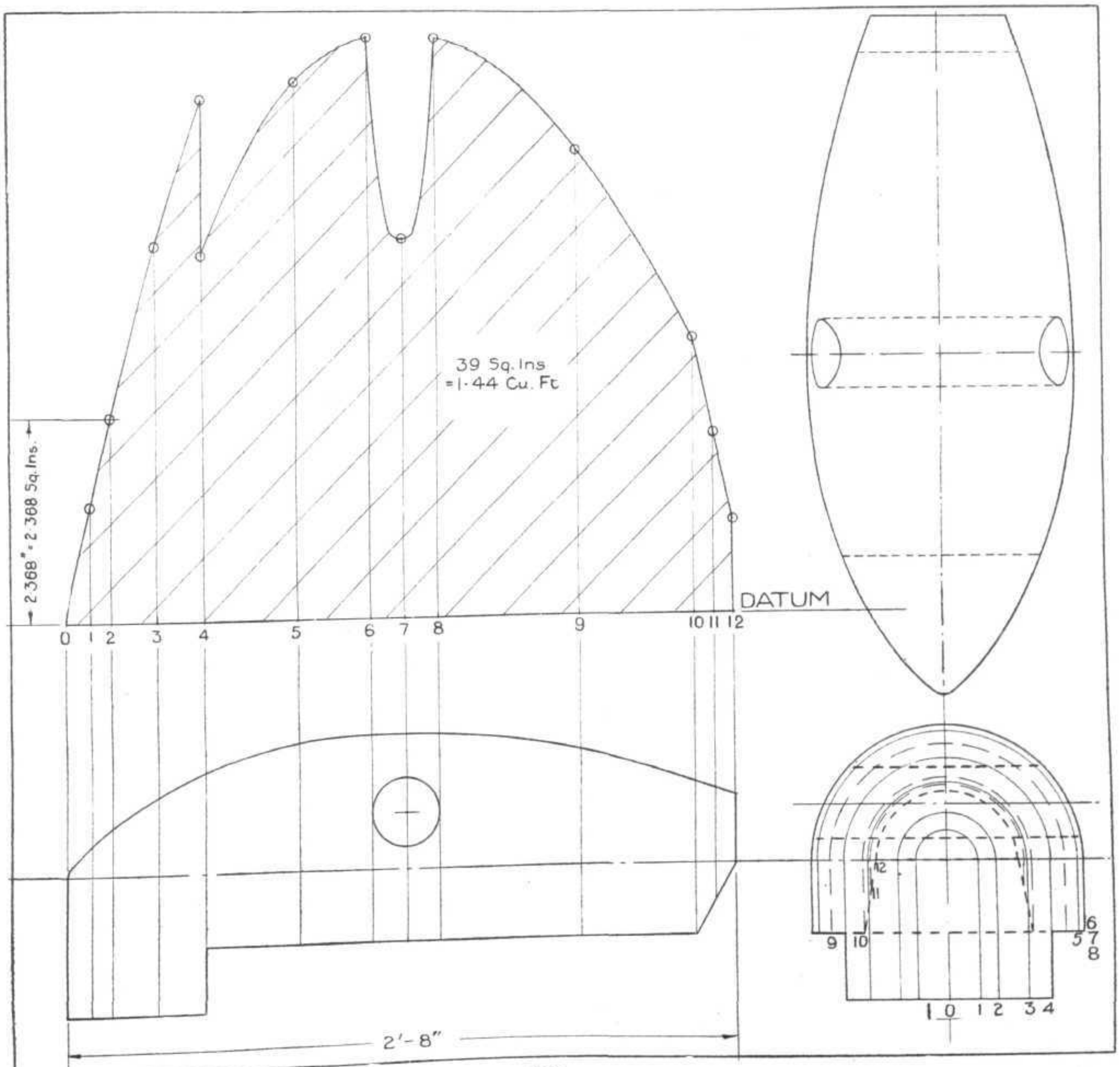
It will first be necessary to draw a datum line above the more elongated view (this will normally be the side elevation).

Then set up ordinates on this view, continuing them upwards above the datum as in the accompanying diagram. These ordinates should be spaced closely where the change of section is at all rapid, but may be quite widely spaced where the slopes are gradual and smooth. It is important that ordinates be placed at all points where a sudden change of section or a discontinuity of curvature occurs. On reference to the diagram (ordinates Nos. 4 and 10), the reason for this will be self evident.

Next, show on the end view the sections at the various ordinates and measure up the areas with a planimeter. These areas should then be plotted on the ordinates with the datum line as a base. They may be plotted exactly as found—it is not necessary to translate to the scale of the drawing, *e.g.*, the sectional area on the drawing at ordinate No. 2 is 2·368 sq. in., this is plotted as 2·368 in., though the actual area at that section would be 2·368 by 16 sq. in. as the scale of the original drawing is 3 in. to 1 foot.

It should be noted that where an edge or a surface of the body (in the side elevation) is vertical, two areas must be taken corresponding with the sections on either side of the ordinate (see ordinate No. 4 on the diagram).

When all the areas have been plotted, join up the points so obtained with fair curves in the usual manner, and take the area of the whole with the planimeter. This area is the



product of the mean ordinate and the base length (*i.e.*, the mean sectional area and the length of the body) and therefore equals the volume.

For the body shown in the diagram, this total area is 39 sq. in.; therefore, as the scale of the drawing is 3 in. to 1 foot, the scale of the ordinates of the area is $\frac{1}{16}$ full size and that of the base $\frac{1}{4}$ full size so that the total volume will be :—

$$39 \times 16 \times 4 \text{ cub. in.} = 1 \cdot 44 \text{ cub. ft.}$$

It also follows that the centroid of the area on the datum is vertically above the C.G. of the body (the solid body—not the shell).

TECHNICAL LITERATURE.

SUMMARIES OF AERONAUTICAL RESEARCH COMMITTEE REPORTS.

EXPERIMENTS ON A MODEL OF A FOKKER (F. VII) MONOPLANE WING. By A. S. Batson, B.Sc., D. H. Williams, B.Sc., and A. S. Halliday, B.Sc. R. & M. No. 1059 (Ae. 241). (21 pages and 19 diagrams.) September, 1926. Price 1*s*. 3*d*. net.

Both the Fokker (F VII) monoplane and the Avro (504K) biplane have been reported to have a remarkable degree of control at and beyond the stall, but, whereas the Avro was fitted with a special device in the form of slot-and-aileron control,* the Fokker was fitted with ailerons of the conventional type, although considerably smaller than those normally fitted to British machines.

These experiments were made to investigate the reason for the reported good controllability of the Fokker (F.VII) when stalled.

Rolling and yawing moments due to rolling were measured over a range of incidence on a 0·0444 scale model. Also rolling and yawing moments due to aileron movement, ranging from − 20° to + 20° by 5° steps, were measured on the stationary model. The wind speed adopted was from 40 to 60 ft.-sec.

An appreciable speed effect was found which made it difficult to predict full-scale results from those deduced from model experiments. These tests, however, indicated that, with reference to the rolling experiments at small rates of roll, pre-stall conditions would be maintained on the Fokker in the neighbourhood of the stall. Both rolling and yawing moments due to ailerons set at ± 20° were approximately half those for the Bristol Fighter (B.F.2b).

* See R. & M. 968. Full-scale tests on a new slot-and-aileron lateral control.—By H. L. Stevens.

THE CHARACTERISTICS OF CERTAIN AEROFOIL SECTIONS FOR INFINITE ASPECT RATIO. By A. S. Hartshorn, B.Sc. Presented by the Director of Scientific Research. R. & M, No. 1072 (Ae. 254). (9 pages and 12 diagrams.) November, 1926. Price 9*d*. net.

For some purposes the characteristics of an aerofoil section for infinite aspect ratio are required. This information is given in graphical form for LV = 40 for the following sections tested at the R.A.E. :—R.A.F. 15, 25, 26, 27, 28, 30, 31, 32, 33, 34 and M.2. The curves shown are :—

(1) Profile drag against lift.

(2) Incidence against lift, the chord line chosen for reference passing through the centres of curvature at the leading and trailing edges.

(3) Pitching moment about a point on the chord as defined above and 0·25 c. back from the leading edge.

THE FLEXURE OF THIN CYLINDRICAL SHELLS AND OTHER "THIN" SECTIONS. By L. G. Brazier, B.Sc., A.C.G.I., late of the Royal Aircraft Establishemnt. R. & M. No. 1081 (M. 49). 22 pages and 11 diagrams). May, 1926. Price 1*s*. net.

It is well known that thin tubes and metal aeroplane spars do not fail under bending by elastic rupture, but by instability. The present paper is an investigation of the problem of a class where some dimensions of the cross section are small compared with others, and the correction required to St. Venant's theory of flexure for this case is determined.

The body is supposed strained in the manner described by St. Venant, is then allowed to undergo a system of displacements, and the position of the system determined by the conditions that the final potential energy is a minimum. The results obtained should promote the formulation of the theory of rational design of thin tubes as beams and metal aeroplane spars. There is some uncertainty about the theoretical constants which may well be modified by later experimental results.

Appended are the results for 11 types of spar calculated for fixed ends and giving the bending stresses in the web, the end load on each web, and the Euler failing load.

THE FLOW OF AIR AND OF AN INVISCID FLUID AROUND AN ELLIPTIC CYLINDER AND AN AEROFOIL OF INFINITE SPAN, ESPECIALLY IN THE REGION OF THE FORWARD STAGNATION POINT. By A. Fage, A.R.C.Sc. R. & M. No. 1097 (Ae. 276). (20 pages and 8 diagrams.) July, 1926. Price 1*s*. net.

A study of some of the characteristics of two-dimensional flow around an aerofoil mounted in a wind tunnel is described in R. & M.989.* This work included measurements of velocity in the neighbourhood of the aerofoil, and the flow pattern in the wind tunnel was also compared with that for an inviscid flow having an equal circulation.

In the present investigation experiments were first made with an elliptic cylinder of large eccentricity, this model being selected because the position of the stagnation point for an inviscid flow could be determined mathematically and the shape approximated to that of an aerofoil ; in general, the position of the stagnation point does not agree in the two cases.

Wind tunnel experiments on an aerofoil of 6-inch chord extending across the tunnel show that as the angle of incidence increases the stagnation point travels around the nose towards the upper surface, and at the critical angle there is an abrupt traverse of the stagnation point in the opposite direction ; other experiments were made on a similar model in the electrical tank.† The results, in general, for the same circulation gave different stagnation points in the two types of experiments, but the general results obtained for the flow from the wind tunnel experiments agree well with the theoretical flow. This difference is attributed to the method of measurement of velocity distribution in the electrical tank, which is not sufficiently accurate for the present purpose.

* R. & M. 989. An investigation of the flow of air around an aerofoil of infinite span. By L. W. Bryant and D. H. Williams.

† R. & M. 1065. Preliminary experiments on two-dimensional flow round bodies moving through a stationary fluid. By B. M. Jones, W. S. Farren and C. E. W. Lockyer.

THE UNDERCOOLING OF SOME ALUMINIUM ALLOYS. By Marie L. V. Gayler, D.Sc. Work performed for the Engineering Research Board of the Department of Scientific and Industrial Research. R. & M. No. 1102 (M. 50). (50 diagrams and 24 pages.) May, 1927. Price 1*s*. 9*d*. net.

In some preliminary experiments an aluminium silicon alloy was poured into iced water, and it was found that complete "modification" could be effected in that way. This result led to a study of the effect of rapid chilling on aluminium-silicon alloys free from sodium, with a view to throwing more light on the process of modification. The investigation was then extended to alloys of aluminium with copper. From the data obtained diagrams were made, which, together with microscopical evidence, threw some light on the undercooling of alloys ; a subject which is of practical importance and of which little is known.

The following aluminium alloys were studied with repsect to a definite rate of cooling, and diagrams have been drawn from the data obtained :—

(1) 0·20 per cent. silicon ; normal and "modified" alloys.

(2) 10 per cent. silicon with 0·2, 0·4, 0·6 and 0·8 per cent. iron.

(3) 0·38 per cent. copper.

(4) 7 per cent. copper wth 0·2, 0·6 and 0·8 per cent. iron.

With regard to the undercooling of silicon-aluminium alloys it has been shown that—

(1) The supersolubility curves for "normal" alloys agree substantially with the accepted "modified" diagram.

(2) It is not possible to obtain supersolubility curves for "modified" alloys.

(3) The addition of sodium causes (*a*) crystallisation to take place at temperatures of spontaneous crystallisation, *i.e.*, at temperatures in the supersolubility curves probably by suppressing the crystallisation occurring on the solubility curves, (*b*) consequently it is probable that there is an increase in the number of nuclei formed.

In connection with the phenomena of undercooling the macro and microstructural changes in a 7 per cent. copper aluminium alloy and a 10 per cent. silicon alluminium alloy due to variations in the conditions of casting have been observed.

THE THEORETICAL PRESSURE DISTRIBUTION AROUND JOUKOWSKI AEROFOILS. By W. G. A. Perring, R.N.C., A.M.I.N.A. Presented by the Director of Scientific Research, Air Ministry. R. & M. No. 1106 (Ae. 283). (13 pages and 12 diagrams.) May, 1927. Price 9*d*. net.

The present calculations have been made to determine the influence of the thickness and centre-line camber upon the pressure distribution around an aerofoil. The calculations have been made for Joukowski aerofoils, the pressure distribution being determined for each aerofoil at three values of the lift coefficient. Three aerofoil thicknesses have been considered (0·05, 0·10, and 0·15 of the chord), and calculations for each thickness have been made at three values of the centre-line camber (zero, 0·026 and 0·053).

The report concludes with the following comments :—

(1) That the rapid increase of pressure behind the negative-peak pressure on some of these aerofoils will cause the flow to break down, and should be avoided as far as possible.

(2) That at high velocities the effect of compressibility will modify the flow locally in the regions of high negative pressure, and an aerofoil in which these high negative pressures occur will be less efficient than one in which the pressure distribution is more uniform.

A generalised type of the Joukowski aerofoil has been discussed by Mr. Glauert in R. & M. 911.

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METAL CONSTRUCTION DEVELOPMENT.

We very much regret that, owing to the length of Mr. Evans' article on "Aerodynamic Interference" and consequent lack of space, it has been necessary to hold over this month Mr. Pollard's article on "Metal Construction Development." A long instalment will, however, be published in the May issue.—ED.

THE GUGGENHEIM SAFE AIRCRAFT COMPETITION

In our issue of March 15 last, we published some rulings made by the Trustees of the Daniel Guggenheim Fund regarding certain questions that had been raised in connection with the Guggenheim Safe Aircraft Competition.

In view of further questions which have been raised in regard to the Competition, the following additional rulings have been made by the Trustees of the Fund :—

5. *Question*.—Is it permissible for the aircraft to taxy round the field before starting on the actual test of take-off ? (Test No. 4.)

Ruling.—The purpose of this test is to demonstrate the take-off from a small field of the average kind, not specially prepared for flying purposes. Taxying is not a disqualification, and if resorted to must meet the following limitations :

1. The taxying must be reasonable and safe in character.

2. The area used must not be more than 300 ft. by 300 ft. and considered as lying on that side of the starting point in which the take-off is to be made.

3. The speed of taxying must be limited to that which fairly rough ground permits before taking off.

4. The actual take-off must be made from a standing start.

6. *Question*.—May the competitor continue the tests after failing definitely in one test ?

Ruling.—The competitor may continue the tests only with the approval of the Fund. In general, the Fund desires that each entrant presenting himself for the Competition shall undertake all the tests.

A King's Flight

The King of Denmark and the King of Belgium visited the aerodrome on the Island of Amager on April 18, and watched an exhibition by Danish airmen. King Albert of the Belgians was then taken for a flight of 35 minutes over Copenhagen by Lieut. Bjaskow.

High Commissioner's Air Tour

Sir Henry Dobbs, the High Commissioner, recently made a rapid air tour over the greater part of the Iraq desert towards the Nedj frontier. He landed first at Bir Lussuf, seventy miles from Nafaj, where he breakfasted in the tent of a sheikh of the Aneiza tribe. In the course of the day, Sir Henry Dobbs flew 700 miles.

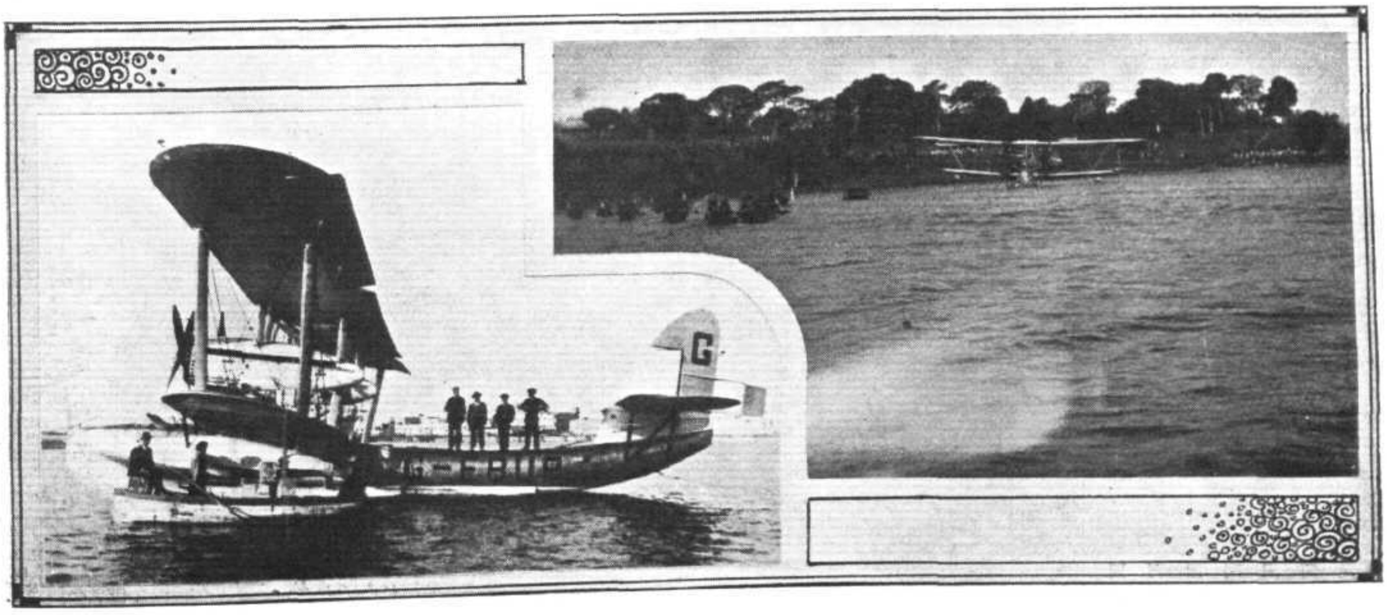
Speed Flight Disaster Verdict

At the resumed inquest at Calshot, April 20, on Flight-Lieut. Kinkead, who was killed when his machine crashed into the Solent, Maj. J. P. C. Cooper, of the Air Ministry, stated as his opinion that the machine stalled at a height of about 50 ft. when the pilot was attempting to land, and that Kinkead misjudged his height above the water. He thought he had abandoned the idea of flying the speed course because of the weather conditions. He was also definitely of the opinion that Kinkead did not do or omit to do anything as a result of being affected in the slightest degree by fumes. The coroner said that Kinkead's death was due to misadventure caused by hæmorrhage, shock, and extensive injuries.

Good Performance

Capt. W. Attwood, an Imperial Airways pilot on the Cairo Baghdad service, has just made his fiftieth flight between those two cities.

THE AFRICAN SURVEY FLIGHT : Three "snaps" taken *en route* to the Cape : At the top will be seen Sir Alan (centre, right) and Capt. Worral (centre, left), the second pilot, coming ashore at Entebbe, Uganda, with Mr. Maitland Warne (extreme left), private secretary to the Governor, and Mr. Raymond Lambert (extreme right), O.C. Motor Launch Flotilla, at Entebbe. The other pictures show —right, an "attack" by native war canoes on the Short "Singapore" on Lake Victoria, taken while a film was being "shot" by Mr. Bonnett, the cinematographer of the expedition. On the left is the Short "Singapore" (Rolls-Royce "Condor") refuelling with Shell.



PRIVATE FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

FLYING TO AUSTRALIA

FLYING from England to Australia and other similar distances by light aeroplane is likely to become an accepted thing before the flying season is over this year. Two Avro "Avians" (Cirrus) have got through this year, one of them in record time, and now a Westland "Widgeon III," fitted with the A.D.C. "Cirrus Mk. II," is attempting the Australian journey. The machine is privately owned by Wing-Commander E. R. Manning, and his sole object is to visit his birthplace, which is at Sydney, Australia, and to attend to private business. Naturally, as an experienced Service pilot, he chose to fly out. The monoplane is standard in all respects except for the additional petrol tank fitted in the front cockpit, which has a capacity of 50 gallons and brings the total petrol capacity up to about 70 gallons. This will enable, if desired, non-stop flights of about 12 hours' duration, equalling roughly a mileage of 1,000 miles. Mr. "Bert" Hinkler, it will be remembered, was able to fly equal non-stop distances, which took him to India within a week and Australia in a day and a half over a fortnight.

But in no sense is Wing-Commander Manning's flight a competitive effort, although he will try to reach his destination as quickly as conveniently possible. He mentioned anticipating taking less time than the mail steamers require. His proposed course differs slightly from that usually followed. Instead of reaching Egypt via Malta, he hopes to cross the Mediterranean from Marseilles to Tunis, on the North African coast, via Sardinia, then follow the coast and pick up the desert route to Iraq; after that going down the Persian Gulf to India, Burma, the Dutch East Indies, and Australia in the usual way.

He will be taking a slightly greater risk by so deviating at Marseilles because by avoiding Italy he will have two fairly long sea flights, the first being approximately 220 miles from Marseilles to Sardinia, and the second roughly 170 miles from the southern extremity of Sardinia to Tunis. The general route to Egypt follows the entire Italian west coast, leaving a sea flight of only 60 miles from Sicily to Malta and another sea flight of 200 miles to the North African coast. From Marseilles direct across the Mediterranean to Tunis is a distance of 470 miles and land is only touched at the southern end of Sardinia. Wing-Commander Manning's proposed landfall at Tunis also means a longer flight than usual along the African coast.

To undertake this venture, this R.A.F. officer was placed on half-pay at his own request, and granted leave until August, and although he may obtain an extension, he stated he would be returning to the R.A.F. at the end of the summer. When asked if it was his intention to fly back, he said he would decide after reaching Australia. If he did not return by air then he would try to sell his monoplane, which had cost him £750. His preliminary expenses in connection with the flight, including the purchase of the machine, had cost £1,000.

Wing-Commander Manning was studying medicine at Edinburgh University when the war broke out, and he enlisted in the Lothian and Border Horse, then transferred with a commission to a reserve cavalry regiment, and was drafted to the 15th Hussars in 1915. Whilst on three months' leave recovering from wounds, he learned to fly privately. He first flew an old Bristol box kite with floats at Lake Windermere and obtained his pilot's ticket at Hendon in January, 1916. In that year he returned to France as a R.F.C. pilot. In 1922 he went to Iraq in command of No. 6 squadron during the Kurdish trouble, and later became Chief Technical Officer at the R.A.F., Egypt Depot. More recently he took command of Northolt air station after a period in the School of Naval Co-operation at Lee-on-Solent, and was latterly attached to Uxbridge Depot. In 1917 he

A "close-up" of the nose of Wing-Commander Manning's Westland "Widgeon III" revealing that well-tried combination the A.D.C. "Cirrus Mk. II" engine and the Fairey metal airscrew.

"FLIGHT" *Photograph*

"Flight" Photograph

FLYING TO AUSTRALIA : This is the Westland "Widgeon III" fitted with the A.D.C. "Cirrus Mk. II" 30/80 h.p. engine which is being flown to Australia from England by its owner, Wing-Commander E. R. Manning. He reached Marseilles from Lympne with one stop at Lyons on the first day, April 23.

won the Military Cross for conspicuous gallantry and devotion to duty and the D.S.O. for distinguished services during the R.A.F. operations in Kurdistan between February and June, 1923. He is a bachelor, and 39 years of age.

His flight to Australia started from Lympne on April 23 at 5.30 a.m. in calm weather, and good visibility. Only a few R.A.F. officers and men witnessed the departure, and they were able to see the monoplane far over the Channel. His personal luggage was contained in a suitcase. By starting this week he hopes to avoid the monsoons which begin at the end of May. The machine reached Lyons at 2.50 p.m. and Marseilles at 6.40 p.m. the same day.

LIGHT 'PLANE CLUBS

London Aeroplane Club, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W.1.

Bristol and Wessex Aeroplane Club, Filton, Gloucester. Secretary, Capt. C. F. G. Crawford, Filton Aerodrome, Patchway.

Hampshire Aero Club, Hamble, Southampton. Secretary, H. J. Harrington, Hamble, Southampton.

Lancashire Aero Club, Woodford, Lancs. Secretary, C. J. Wood. Oakfield, Dukinfield, near Manchester.

Midland Aero Club, Castle Bromwich, Birmingham. Secretary, Maj. Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

Newcastle-on-Tyne Aero Club, Cramlington, Northumberland. Secretary, A. H.Bell, c/o The Club.

Norfolk and Norwich Aero Club, Mousehold, Norwich. Manager, F. Gough, The Aerodrome, Mousehold, Norwich.

Nottingham Aero Club, Hucknall, Nottingham, Hon. Secretary, Cecil R. Sands, A.C.A., Imperial Buildings, Victoria Street, Nottingham.

The Scottish Flying Club, 101, St. Vincent Street, Glasgow Secretary, Harry W. Smith.

Southern Aero Club, Shoreham, Sussex. Secretary, C. A. Boucher, Shoreham Aerodrome, Sussex.

Suffolk Aeroplane Club, Ipswich. Secretary, Courtney N. Prentice. "Hazeldell," Stowmarket, Suffolk.

Yorkshire Aeroplane Club, Sherburn-in-Elmet, Yorks. Secretary Lieut.-Col. Walker, The Aerodrome, Sherburn-in-Elmet.

LONDON AEROPLANE CLUB

Report for week ending April 22.—Total flying time, 38 hrs. 50 mins. Dual instruction, 25 hrs. 5 mins. Solo, 13 hrs. 45 mins.

Dual Instruction :—With F. R. Matthews : L. F. Petty, Miss Johnson, G. A. Stedall, G. E. Clair, A. S. Millar, J. Hansel, R. Ward, R. Drysdale Smith, W. H. Lane, A. S. Mulder, Miss D. B. Fletcher, H. Sutton, W. L. M. O'Connor, E. R. Andrews, J. A. Brewster, D. Green, B. L. Middleton, G. C. Gotheridge, Mrs. Guest, Miss Wilson.

With Capt. S. L. F. St. Barbe : E. Davis, A. P. Glenny, J. A. Crane, Lord Carlow, Miss D. B. Fletcher, G. Black, A. S. Millar, J. P. Edinger, J. Bickley, R. C. Presland, J. C. Crammond, R. Ward, J. C. V. K. Watson, R. D. Smith, A. S. Richardson, F. C. Fisher.

Solo Flying :—P. W. Hoare, H. B. Michelmore, C. E. Murrell, B. B. Tucker, J. H. Saffery, G. H. Craig, J. A. Brewster, M. L. Bramson, E. E. Stammers, W. Hay, H. M. Samuelson, H Solomon, Maj. K. M. Beaumont, A. S. Mulder, J. G. Crammond, R. Ward, E. C. T. Edwards, W. L. M. O'Connor, J. J. Hofer, T. C. Fisher, E. L. D. Moore.

On Friday, April 20, W. L. M. O'Connor passed the tests for his Aviator's Certificate, and on Sunday, April 22, J. A. Brewster also passed the tests.

HAMPSHIRE AEROPLANE CLUB

Report for week ending April 22.—Total flying time, 34 hrs. 10 mins. Dual instruction, 16 hrs. 10 mins. "A" pilots, 8 hrs. 15 mins. Solo, 4 hrs. 35 mins. Passenger flights, 4 hrs. 20 mins. Test, 50 mins.

Instruction with Flight-Lieut. Swoffer, 21 ; "A" pilots, 13 ; soloists, 9 ; passengers (with Flight-Lieut. Swoffer), 5 ; (with Don Cierva), 1 ; (with Mr. Leech), 1 ; (with Mr. Jopp), 1 ; (with Capt. Kirby), 9 ; (with Mr. Fagan), 4 ; (with Mr. Bowen), 2 ; (with Mr. Parker), 1.

Mr. Bott, after a short "refresher," made two successful solos. Mr. Scott-Hall and Mr. Curtis-Nuthall also completed their successful first solos this week.

Lieut.-Com. Kidston completed his tests for his "A" licence on April 18 and arrived at Hamble on April 21 from Stag Lane, complete with Royal Aero Club Certificate, "A" licence, and his own Moth, which he later flew back to Stag Lane.

We understand that he intends flying, on Monday, April 23, to Le Touquet. Some hustle what !

Mr. Baynes and Mr. Shepherd are now in possession of their "A" licences.

LANCASHIRE AERO CLUB

Report for week ending April 21.—Flying time, 17 hrs. 30 mins. Instruction, 9 hrs. 15 mins. Solo flights, 5 hrs. 15 mins. Passengers, 1 hr. 45 mins. Tests, 1 hr. 15 min.

Instruction :—With Mr. Baker : Watson, Birley, Allott, Slack, Mills, Mason, Mehta, Barlow, Johnson, Miss Emery, Brooking, Stern, Harrison, Sellers, Stross, Pattreioux, Williams, Benson, Weale.

Soloists (under instruction) :—Gort, Mills, Hall.

Pilots :—Twemlow, Lacayo. Meads, Cohen, Caldecott, Birley, Harber, Nelson.

Passengers :—With Mr. Goodfellow : Miss Booth. (With Mr. Baker : Miss Combes. With Mr. Michelson : Hamilton. With Mr. Meads : Cheyne. With Mr. Williams : Stern, Johnson, Weale. With Mr. Williams : Adams.

Beastly weather. Messrs. Gerrard and Gort completed the tests for their "A" licences.

MIDLAND AERO CLUB LIMITED

Report for week ending April 21.—The total flying time was 14 hrs. 41 mins. Dual, 9 hrs. 12 mins. Solo, 4 hrs. 17 mins. Passenger flights, 35 min. Tests, 37 mins.

The following members were given dual instruction by Flight-Lieut. Rose :—W. M. Morris, H. Tipper, J. B. Briggs, K. W. Symington, Capt. H. G. E. Towe, O. L. Richards, H. Beamish, S. G. Hall.

Secondary dual :—G. Aldridge, J. R. H. Baker, E. D. Wynn, A. B. Gibbons.

Soloists :—J. R. H. Baker, R. D. Bednell, H. Tipper, C. W. Fellows, E. J. Brighton, S. H. Smith, R. L. Jackson, E. D. Wynn, A. B. Gibbons, J. Rowley, G. Aldridge.

Passengers :—N. C. Harrison, R. C. Baxter.

On Wednesday, Mr. Harry Tipper was launched solo and put up a good performance.

NEWCASTLE-UPON-TYNE AERO CLUB

Report for week ending April 22.—Total flying time, 21 hrs. 55 mins. Dual, 8 hrs. 45 mins. "A" pilots, 12 hrs. 15 mins. Tests, 55 mins.

Instruction (with Mr. Parkinson) : Miss Slade, Mr. L. M. Middleton, Mr. F. W. Redshaw. Advanced dual : Mr. J. Lloyd Browne, Mr. W. L. Runciman.

"A" pilots : Mrs. Heslop, Miss Leathart, Messrs. R. N. Thompson, C. Thompson, J. D. Irving, W. L. Runciman, J. T. Percy, J. Lloyd Browne,

N. S. Todd, D. Wilson, W. Baxter Ellis, H. Ellis, F. L. Turnbull, A. H. Bell, and Dr. Alderson.

Passengers (with Mrs. Heslop): Miss Bamley, Mr. Alton, Mr. Jennings, Mr. C. Thompson. (With Miss Leathart): Mr. W. L. Runciman. (With Mr. Baxter Ellis): Mr. R. G. Lawson. (With Mr. C. Thompson): Mrs. Heslop, Mr. Bulmer, Mr. Luckman, Mr. Temple. (With Mr. N. S. Todd): Mr. Walker. (With Mr. A. Bell): Mrs. Laing Gibbon, Mrs. Brooks.

Strong winds prevailed from Monday until Saturday and all but about three hours of the week's total of flying was carried out on Saturday and Sunday.

NORFOLK & NORWICH AERO CLUB

REPORT for week ending April 22.—Total flying time, 7 hrs. 45 mins. Soloists: Messrs. F. Gough, H. Mack, N. Brett, R. Potter, W. P. Cubitt, R. T. Harmer, H. A. Pank, W. A. Ramsay. Passengers: 21.

The very severe wintry weather has cut our flying time down this week, and as our instructor does not return until the middle of next week, we have been unable to give pupils much flying. It has been quite disappointing, and we hope with the new moon in to get a spell of respectable weather.

NOTTINGHAM AERO CLUB

REPORT for week ending April 13:—Total flying time, 21 hrs. 50 mins. Dual, 10 hrs. 55 mins.; solo, under instruction, 2 hrs. 15 mins.; solo, "A" licence, 2 hrs. 30 mins.; passenger, 5 hrs. 35 mins.

Dual (with Mr. B. Martin): Messrs. Ashworth, Bradley, Challard, Selvey, Moore and Dawson.

Solo (under instruction): Messrs. Granger, F., Pilgrim.

Solo ("A"): Messrs. Cox, Blake, Seely-Whitley, Sands, Wilcox and Hallam.

Passengers (with Mr. Martin): Miss Paige, Mr. Paige, Mrs. Pinchin, Messrs. Granger, Neale, Dickson and Pratt. (With Mr. Cox): Mr. Neale. (With Mr. Blake): Mr. Pratt. (With Mr. Hallam): Miss Severn, Mr. Kay. (With Mr. Wilcox): Mr. Walker.

With the advent of daylight saving, we hope to increase our flying time considerably, in addition to which we are expecting another machine shortly, but more of that later. Granger, F., successfully passed his tests for his "A." We are contemplating an issue of tin helmets to future visitors with inquisitive natures.

REPORT for week ending April 20.—Total flying time, 8 hrs. 50 mins. Solo "A" time, 30 mins.; passenger flights, 1 hr. 25 mins.; tests time, 30 mins.; dual time, 6 hrs. 25 mins.

Passengers (with Mr. Martin): Miss Booth, Miss Lange, Messrs. Hatton, Lomax, and Roberts. (With Mr. Hallam): Mr. Kay. (With Mr. Whitby): Mr. R. D. Glenn.

Dual (with Mr. Martin): Messrs. Selvey, Booth, Moore, Hatton, Glenn, Bradley, Lazzerini, and Ashworth.

Solo "A" licence: Messrs. Hallam and Whitby.

We seem to have dropped back into winter this week with the weather, and consequently flying time has dropped.

Messrs. Wood and Powell, of the Surrey Flying Services, dropped in on us on Sunday morning *en route* for Barnsley, but otherwise the week has been uneventful.

SCOTTISH FLYING CLUB, LTD.

GOOD progress was made during the month of March, as will be seen from the statistics below. In spite of the fact that G-EBVT had to undergo a top overhaul, this did not to any extent curtail the number of hours flown.

There are at the moment some six *ab initio* pilots who are only awaiting their "A" licence from the Air Ministry to be included in the statistics, and besides these, there are a further half-dozen who should be in a position to secure their tickets within the next six weeks.

It is hoped as the weather improves, a larger number of members will be able to undergo instruction, and from the steady flow of new members who are joining, it will soon be necessary for the Club to have another machine.

The third and last staff dance of the year was successfully held on the 30th, when a large number of members and their friends attended, a considerable sum being thereby raised for the Establishment Fund.

The petrol pump should be ready for use early next week, and a considerable saving in the cost of petrol should thereby be attained.

No comment is made on the activities of the Club from a flying point of view as the following statistics speak for themselves:

Total hours flown, 138·30; number of members under instruction, 77; number of solo flights, 91; total number of actual flights undertaken, 351; number of days when flying was possible, 20; number of members who secured their "A" licence, 5; total number of members with "A" licence, 17.

YORKSHIRE AEROPLANE CLUB

REPORT for fortnight ending April 14.—Flying time, 39 hrs. 30 mins. Instruction, 21 hrs. 10 mins. Soloists, 16 hrs. 5 mins. Passengers, 2 hrs. 15 mins.

Instruction (with Captain Beck): Messrs. Ambler, Bell, Birch, Brackenbury, Brown, Clayton, Cooke, Crowther, A., Crowther, H., Daly, Fitton, Gill, Humpheries, Ostler, Priestley, Rowley, Senior, Sugden, Watson, Yeomans.

Soloists: Messrs. Ambler, Atcherley, D., Birch, Clayton, Crowther, A., Crowther, H., Dick, Humpheries.

"A" Pilots: Messrs. Atcherley, R., Brackenbury, Dawson, Lister, Norway, Thomson, I., Watson, Wilson, Wood.

Passengers (with Captain Beck): Mr. Blake, Mrs. Blake, Miss Hardwick; (with Mr. I. Thomson), Mrs. Brackenbury; (with Mr. Wood), Messrs. Bell, Humpheries, Swift.

During the past fortnight the weather has been more kind to us, but we have been hampered by still having only two aeroplanes available.

On April 1, that energetic member of ours, Mr. Bob Brackenbury, managed to break loose from his garrison at Plymouth, whence he motored up to put in half-a-day's flying at his Club.

We would like to draw the attention of all concerned that we now have a very pleasant little Club-house, where refreshments of both the solid and liquid variety may be obtained by those alighting on the Aerodrome. We would particularly welcome the visit of any private owners who might happen along this way.

REPORT for week ending April 21.—Flying time, 12 hrs. 55 mins. Instruction, 5 hrs. 45 mins.; soloists, 6 hrs. 35 mins.; passengers, 35 mins.

Instruction (with Capt. Beck): Messrs. Clayton, Collins, Crowther, A., Dick, Ellison, Fitton, Mann, Rowley, Senior, Sugden, Miss Woodhead.

Soloists: Messrs. Clayton, Crowther, A., Crowther, H., Dick.

"A" Pilots: Messrs. Ellison, Mann, I. Thomson.

"B" Pilot: Mr. Fielden.

Passengers (with Capt. Beck): Mr. Blake; (with Mr. Ellison) Mr. Clayton.

An uneventful week as the staff took their Easter holidays on Tuesday and Wednesday. Thursday and Friday we had gales, snowstorms, etc., so that most of our flying time was accomplished on two days—namely, last Sunday and this Saturday.

FROM THE FLYING SCHOOLS

The De Havilland Flying School, Stag Lane Aerodrome

REPORT for week ending April 22.—Total flying hours, 129 hrs. 40 mins. Instruction: dual, 31 hrs. 10 mins.; solo, 80 hrs. 55 mins. Other flying, 17 hrs. 35 mins.

One pupil carried out a successful first solo, and many others completed their courses.

Twelve new "Moths" were tested during the week.

Henderson Flying School, Brooklands Aerodrome

REPORT for week ending April 12.—Total flying time, 44 hrs. 30 mins. Dual (with Mr. H. D. Davis and Mr. A. E. Golds): Messrs. Hsiao, Mitchell, Hamilton, Worley, Murray-Philipson, Hughes, Payne, Mills, Jonassen, Col. Rice, Dr. Forcyth, Flight-Lieut. Halliwell.

Solo: Messrs. Liniker, Crabtree, Anderson, Flight-Lieut. Halliwell.

Owing to the Easter holidays and the Lympne meeting, the school has been slightly interfered with. The machines are now back and flying is proceeding as usual.

Report for week ending April 19.—Total flying time, 14 hrs.

Dual (with Mr. H. D. Davis): Messrs. Mitchell, Hsiao, Quilter, Worley, Payne, Hughes, Habsburg, Col. Rice, and Dr. Wall. (With Mr. A. E. Golds) Messrs. Mitchell, Payne, and Dr. Forcyth.

Solo: Messrs. Crabtree, Hamilton, Patton, Bethune, Anderson, Whitley.

Mr. Hughes launched solo after 3 hrs. 40 mins. dual, and Mr. Quilter after 3 hrs. 35 mins.

Messrs. Habsburg and Hamilton are now waiting for their height tests.

Lieut.-Col. G. L. P. Henderson is now on his way home after a very successful tour in South Africa and will take charge of the affairs of state next week.

Special comment should be made on Mr. Quilter's efforts, as all his flying has been at 7 a.m., before he started business.

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Newspaper Air Tour

HAVING the natural belief that this year will rank significantly in the progress of the light aeroplane for private flying, the *Daily News and Westminster* has organised an air tour of 4,000 miles round Europe in an Avro "Avian" (Cirrus engine). Their Air Correspondent, Mr. E. C. Bowyer, with Capt. Neville Stack as pilot, left Croydon on April 20 at 7 a.m., and reached Le Bourget at 9.40 a.m. The former is keeping details of the flight as a guide for private air tourists, and his first statistics showed that for the initial stage of 230 miles, 8¾ gallons of petrol and less than a quart of oil were consumed. The load of two persons and their luggage totalled 1,600 lbs., and the speed was 85 m.p.h. A landing tax of 9*d*. was paid at Le Bourget and the departure from there was seriously delayed by customs formalities. In the afternoon the Avro "Avian" reached Bordeaux, and the aerodrome there was found to be rough, with pools of water scattered about. The 310 miles from Paris had taken 4¼ hours against a slight head wind. The tourists met Air Vice-Marshal Sir Sefton Brancker at Bordeaux, who expressed his keenest interest in and approval of the tour. Of the facilities provided at the aerodrome they had but one criticism to make—petrol could not be bought in a quantity of less than ten gallons at a time. On the following day they flew to Biarritz in 1½ hours. At that stage, 660 miles had been covered since the departure from England, in 8 hrs. 20 mins. flying time. Petrol consumption had been 30 gallons, equalling 22 miles to the gallon. Petrol is not available at Biarritz aerodrome, and the tourist has to resort to the town. The nearest weather organisation is at Pau, 50 miles away.

The Modest Tourist

IT was but recently that Lieut.-Commander MacDonald learned to fly at the De Havilland School at Stag Lane. He then immediately purchased a D.H. "Moth" and started to fly to India without announcing his intention to anyone. This modesty has prevailed over his subsequent progress. He reached Heliopolis on April 18.

The Club Movement in America

THE Dennison Airport Flying Club was recently formed at Boston, with the object of promoting the science of aeronautics and enabling its members to learn to fly at "cost price." The Club has obtained a new "Waco" machine, which will be used for both instruction and joy-riding. Another club has been formed by the joint efforts of the members of the Sikorsky Mfg. Corp. and of the Edo Aircraft Corp., both of College Point, Long Island, N.Y. Further recruits will be obtained from aeronautical enthusiasts in the town, and the designs for a machine have been got out, which will be constructed by the members and used for instruction purposes.

Air Dash to India

IT is reported that plans are being made for a British air dash from England to India this summer in four days.

THE VICKERS-POTTS OIL COOLER

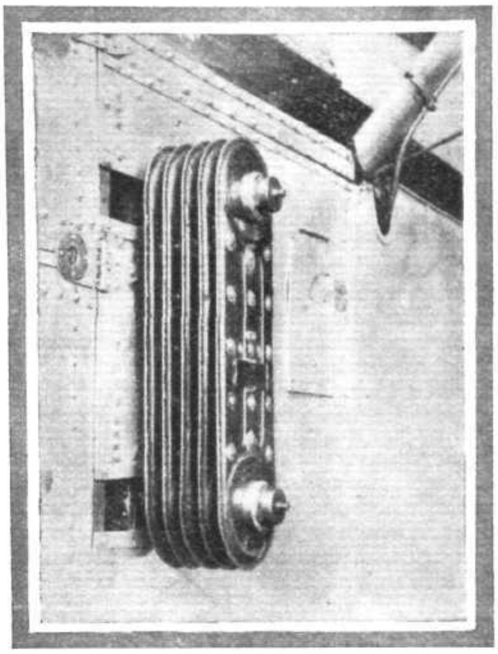
IN modern high-speed aircraft, with their high-powered engines cowled in as much as possible, the heat which is imparted to the lubricating oil during its passage through the engine cannot readily be radiated from the crankcase—a system of cooling that gave more or less satisfactory results in the past. Today, therefore, it becomes necessary to seek some other means for reducing the temperature of the oil before it makes its journey through the engine.

The usual method of doing this is to insert a special oil cooler in the pipe line between the engine scavenger pump and the oil tank. Such a device is the Vickers–Potts oil cooler, which forms the subject of the accompanying notes and illustrations, and which is manufactured by Vickers, Ltd., of Vicker's House, Broadway, Westminster, S.W.1.

The Vickers–Potts oil cooler—which is used extensively on machines of the Royal Air Force—is a standardised unit of comparatively low aerodynamic resistance, and can therefore be placed in the slipstream of the air screw or other convenient place on practically every type of aircraft. It consists of a series of hollow fins threaded on two tubes, through which the oil passes on its way from the engine to the oil tank. These fins are arranged for series flow, *i.e.*, through each fin or element in turn. A byepass valve is inserted between the inlet and outlet pipes, to provide an alternative path for the oil when starting from cold, and also to prevent excessive pressures on the fins.

The internal construction of the cooling element is such that the oil is exposed in thin layers to the cold surface of the fins, while spacers between the fins break up the flow of oil by eddying, thereby causing a rapid transfer of heat. The external space between the fins—which is increased by the local flattening of the latter—enables the air to pass freely between them without causing undue drag.

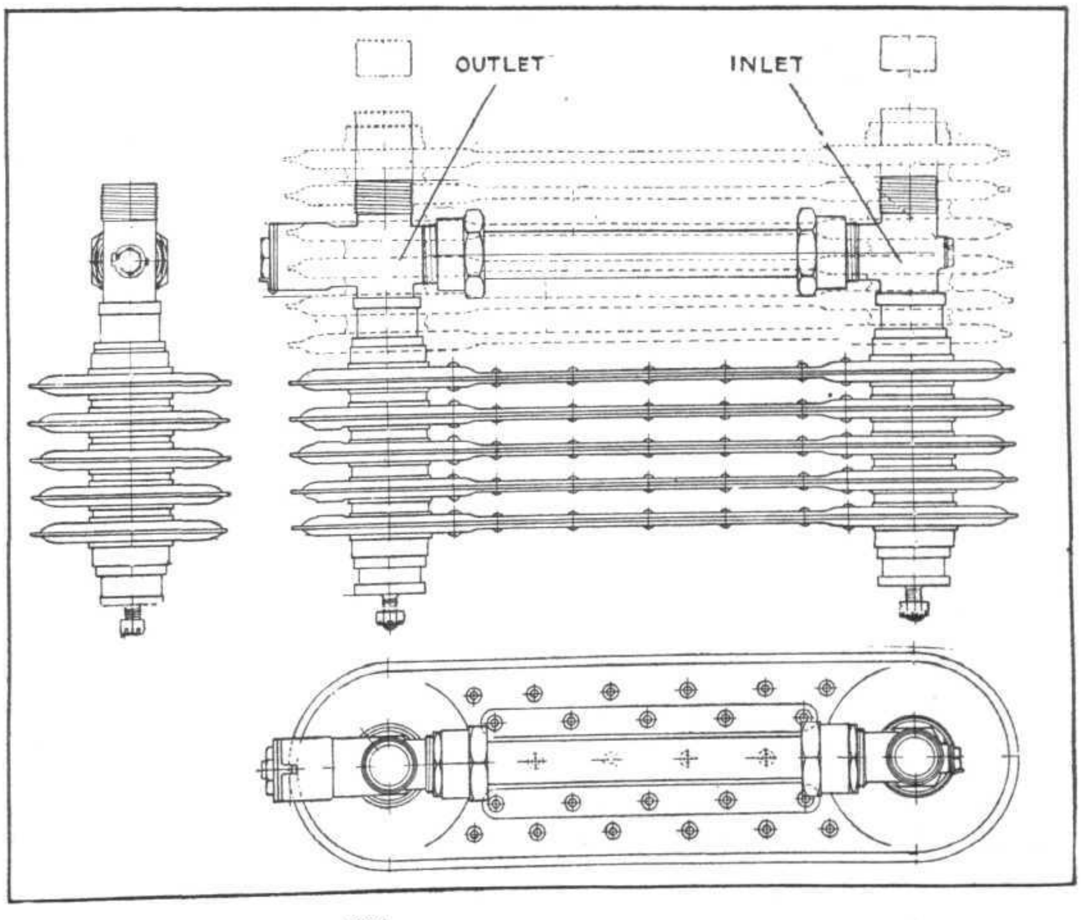
These fins are all of standard dimensions, so that any number may be employed from 5 to 11 fins, to suit all engines, from 250 h.p. to 800 h.p., and to meet the various requirements. Standard coolers are made with 5, 7, 9 and 11 fins to cover this range. The cooling surface per fin is approximately 145 sq. in. (930 sq. cm.), and the reduction of temperature of the oil in passing through one fin is from 1° to 6° C., according to the rate of flow and the temperature of the air; the complete unit should permit oil being returned to the engine at a temperature of 70° C.



The Vickers-Potts Oil Cooler, as fitted on an aircraft with a Bristol " Jupiter " engine.

The complete weights, and the drag at 100 m.p.h. (air flow along major axis of fins) of the various units are as follows:—5-fin unit, weight 9·75 lbs. (4·4 kgs.); drag, 1·16 h.p.; 7-fin unit, 11·75 lbs. (5·3 kgs.); 1·46 h.p.; 9-fin unit, 14 lbs. (6·35 kgs.), 1·79 h.p.; 11-fin unit, 16·5 lbs. (7·5 kgs.), 2·1 h.p. This cooler measures approximately 1 ft. 4 in. in length by $4\frac{1}{2}$ in. wide, and projects from the fuselage, etc., from about 5 in. in the 5-fin unit, to about $9\frac{3}{4}$ in. in the 11-fin unit.

The Vickers-Potts Oil Cooler. This diagram shows the arrangement of the fins, which are made up in units of 5, 7, 9 and 11, according to requirements.



AIRISMS FROM THE FOUR WINDS

African Survey Flight

SIR ALAN COBHAM, who was forced down at Fresco Bay, on the Ivory Coast, on April 17, on his way from Bingerville to Sierra Leone, is awaiting spare parts from England. He is likely to be delayed for two weeks.

Great Flying-Boat Cruise

THE four R.A.F. Supermarine-Napier "Southampton" flying-boats, which have been at Singapore for some time, since arriving there after the successful flight from England, were expected to resume the cruise to Australia on April 21.

African Service Flight

THE three R.A.F. Fairey IIIF machines engaged on the annual Service flight through Africa, arrived at Nairobi on April 19 with four South African Air Service machines.

Going Home Again

MR. "BERT" HINKLER left Adelaide for Nhill, Victoria, on April 18, on the return flight to his home at Bundaberg. He stated that he would endeavour to speed up the Australian Governments in connection with the establishment of an air service with England.

Light 'Plane Flight to England

LADY HEATH has been detained at Sollum, Egypt, whilst repairs have been done to her Avro "Avian," which had the tail-skid damaged whilst Lady Heath was taking off.

Lady Bailey Proceeds

LAST week Maj. Meintjes, of the South African Air Force, arrived at Tabora from Pretoria, in a D.H. "Moth," in which Lady Bailey could resume her flight to the Cape. Lady Bailey, therefore, resumed her journey in this machine on, we believe, April 20, and flew to Broken Hill. In spite of an attack of influenza, she continued her flight on April 24 and reached Livingstone.

Capt. Wilkins' Next Venture

IT has been stated by Mr. A. Lockheed, who designed the Lockheed monoplane which took Capt. Wilkins across the Arctic, that the latter will next attempt to fly over the South Pole. This has provoked speculation as to whether there will be a race between him and Commander Byrd. Capt. Wilkins' plans are well advanced and his speedy return to America is expected. He hopes to leave Green Harbour shortly for Oslo.

South Pole Expedition

COMMANDER R. E. BYRD, the well-known American pilot who crossed the Atlantic last year and landed on the coast of France, and also carried out a flight to the North Pole and back, is preparing for an Antarctic expedition. He will use three aeroplanes. One of them will be a Bellanca monoplane fitted with the Wright "Whirlwind" engine, and the other machines will probably be a three-engined Ford and a low-powered machine. The expedition will leave New York in September next in the ship *Samson*.

A Novel Dirigible

A NOVEL type of dirigible is, it is stated, nearing completion in America. This is an all-metal ship being developed at the Glendale Airport, California, by Thomas B. Slate. It is constructed of corrugated duralumin sheets riveted to circular ribs within the envelope, and has no internal bracing, keel, nor built-up framework. This construction is claimed to be more than half as light as the orthodox truss-framework-fabric type airships, yet is expected to possess equal strength characteristics. The airship, which will be propelled by a steam turbine driven air blower mounted in the nose, measures 150 ft. in length, 40 ft. in diameter, and accommodates 40 passengers.

U.S.A. Airship Programme

THE Navy Department, U.S.A., has invited tenders for the construction of the two dirigibles which were authorised some time ago by Congress. The tenders have to be submitted by July 26. About £1,600,000 will be spent on the ships. They will be 787 ft. long, capable of carrying five aeroplanes, and have a cruising radius of 11,200 miles.

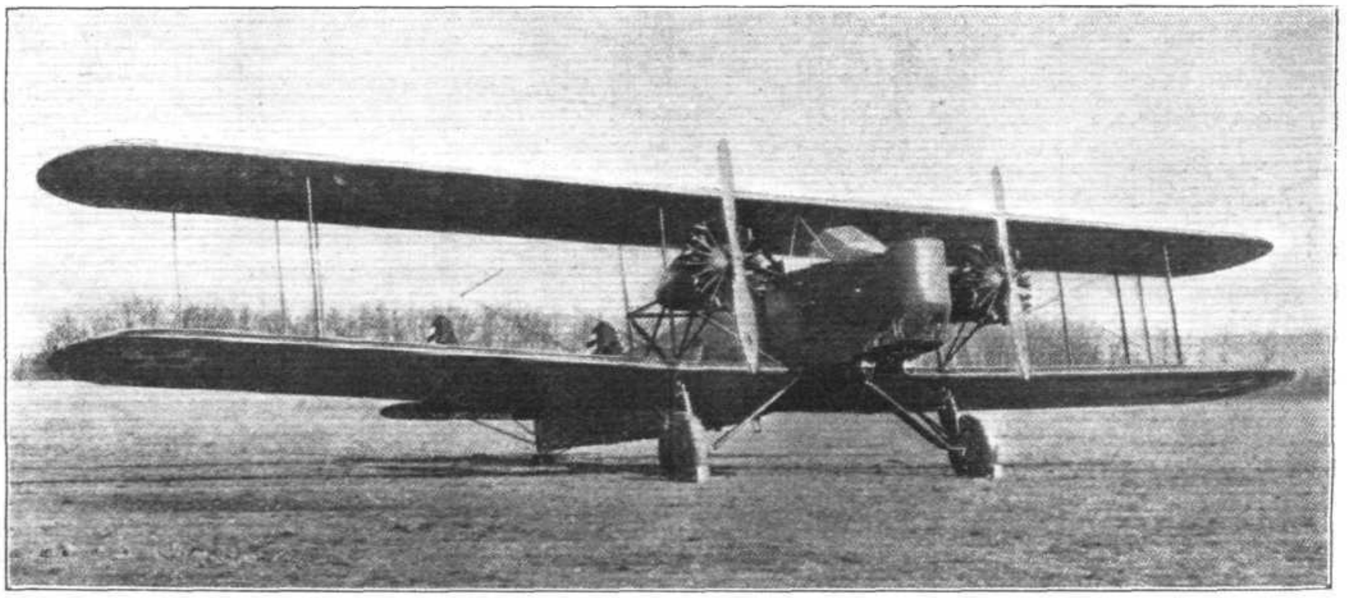
Afghan-Soviet Air Agreement

CONCERNING the Afghan-Soviet air agreement for an air service between Kabul and Tashkent, both Governments agree to employ only their own nationals. Machines will leave Kabul on the 1st and 15th of each month, and Tashkent on the 18th and 28th. The fare will be £27 10s. Luggage up to 8 kg. (roughly 17 lb.) will be carried free, but there will be a charge of 8s. for each additional kilogram.

Twenty Years Ago!

Extract from "The Auto." (Precursor of "Flight"), April 25, 1904.

"'*Zeppelin IV*.'—The mammoth airship which Count Zeppelin is having constructed on Lake Constance is nearing completion, and may be expected to make its trial trip towards the end of next month. On the score of size alone it will be one of the most interesting machines of its class ever built, for its total length is no less than 146 yards and it is over 16 yards in diameter."



A RECENT AMERICAN BOMBER: The Keystone (Huff-Daland) XLB-6, fitted with two 500 h.p. Wr.ght "Cyclone" air-cooled radial engines. It is similar to the "Pirate" (400 "Liberty") produced some while back by the Keystone firm, and is a development of the "Pegasus" (described in "Flight" for February 3, 1927) and the "Cyclops" (described in "Flight" for March 17, 1927).

A VERY JOLLY AFFAIR

A.I.D. Puts Away the Micrometer and Microscope for One Evening

Just why the annual dinners of the Aeronautical Inspection Directorate should always be a little better in every respect than the majority of similar functions we have never been able quite to make out. That they are is an undoubted fact. There is a general feeling of good fellowship. Everyone knows everyone else. The speeches are always witty, and often brilliant; and the time flies with incredible swiftness, so that, even on the rare occasions when Mr. "Jack" Jarvis's time table breaks down (through no fault of his) one is never aware of the fact, and "Auld Lang Syne" and 11 o'clock arrive unexpectedly early.

The Annual Dinner of the A.I.D., held at the Hotel Russell, Russell Square, on Friday, April 20, was no exception to the rule, and as a sign of the ever-growing popularity of this event it may be mentioned that the number of those present exceeded 260, an increase of more than 60 as compared with last year's dinner. A feature of this year's gathering was that the majority of the new guests came from the aircraft industry, which was extremely well represented. In the chair was Mr. J. J. A. Gilmore, B.A., A.R.C.Sc., who is Chairman of the Council of the A.I.D. Technical Staff Association.

After the Loyal Toast, Air Vice Marshal Sir John F. A. Higgins, K.B.E., C.B., D.S.O., A.F.C., Air Member for Supply and Research, proposed "The A.I.D." He complained of suffering under several disabilities. To begin with, he had already spoken at the A.I.D. Congress in the morning, when he had said pretty well all that was to be said. Having found out that Mr. C. R. Fairey would be present and was to speak, he had attempted to find out what Mr. Fairey was going to say, so as to be in a position to say it first. (Laughter.) He had, however, been unsuccessful, either because Mr. Fairey did not know, or more probably because he was too wily to tell. He had had no more success with the gentleman on his left, Mr. McAnally.

In rather more serious vein, Sir John said he was very glad indeed to see the large increase in the number of those present, this amounting to some 50 or 60 more than last year, and to note that the guests that evening included a large proportion of constructors. He was glad of this because he always welcomed anything which tended to link the A.I.D. and the constructors closer together. Little remained for him to add to what he had said at the Congress during the morning, except to express his gratification that during the year the A.I.D. had maintained its reputation for good honest inspection, and in doing so had the full confidence of the R.A.F. and of the constructors. He was glad that the A.I.D. had been put on the same level as other technical departments by having now at its head a Director instead of a Deputy-Director.

Lieut.-Col. H. W. S. Outram, C.B.E., Director of the A.I.D., complained that he was faced with the difficulty of countering all the nice things said about the A.I.D. by Sir John. He was afraid that some of his inspectors might get exaggerated ideas of their importance—(laughter)—but he would refrain on this occasion from touching on that subject.

Whatever the letters A. I. D. might stand for, Aeronautical Inspection Department, Directorate or anything else, it really boiled down to this, that the A. I. D. was a "team," and it was by good team work that they must proceed. He recalled that during the war the "team" grew very big indeed. After the war they endeavoured to keep up the *quality* even when the "team" grew very small. Then came the slump, about 1922 or so, when there were practically no orders and the A.I.D. dropped to its lowest level numerically. The slump was followed by a period when orders began again to be placed, and as a consequence the industry began to get "uppish." (Laughter.) It then had to be shown what inspection *really* meant! He was sincerely glad to see that evening the industry so well represented. The constructors were really an important part of the "team," and he wanted to say how much he appreciated the good feeling between the industry and the A.I.D. Without that the A.I.D. could not do its work efficiently.

Mr. J. J. A. Gilmore, in proposing "The Guests," said it seemed that the S.B.A.C. was represented *en masse*, and it was, of course, well known that when the S.B.A.C. spoke, the Air Ministry trembled. He referred to the very great interest which Sir John Higgins had taken in the affairs of the A.I.D., and mentioned that about a year ago there were those who rather feared that Sir John had dropped a bomb by his suggestion of an interchange between the A.I.D. and other departments. Some had probably feared that there might be hidden away some sinister motive. He was glad to say that it had proved something much more laudable, and had brought them together. Referring to last year's dinner, and to comparing Sir John Higgins with a Daniel in a den of lions, he thought a more apt comparison would be to regard him as the hand that wrote on the wall. Rather would he say that Col. Outram was the Daniel.

Mr. Gilmore expressed pleasure at seeing so many guests of the D.T.D., whose presence was a welcome sign of close co-operation, and he also was glad to see so many contractors present, mentioning in particular Mr. Maxwell Muller, a director of Vickers, and Mr. C. R. Fairey, one of the "captains of the aircraft industry."

Once more with a twinkle in his eye, Mr. Gilmore referred to those "who had gone outside the sheltering walls of the Air Ministry and into the hard, cold world." He was glad to notice that they did not look as if they had crossed the Rubicon at great financial loss! In this connection, he would like to ask them that when, in future, they made use of the phrase, "We have to work for a living," as they often did, they would not put to much emphasis on the personal pronoun.

Mr. H. W. W. McAnally, C.B., in replying, delivered one of his usual witty and amusing speeches. Unfortunately, it cannot be given in full for various reasons, and thus will lose most of its charm. That, however, is inevitable, and cannot be helped. Mr. McAnally began by saying that he was very glad to find that the A.I.D. had continued to apply themselves to their biblical studies during the past year! Reference had been made to Daniel in the den of lions, and to the writing on the wall. He would, however, commend to their attention during the coming year three men in the Scriptures. He was referring to Shadrach, Meschach and Abednego, who passed through the fire and were not consumed. Those present had all eaten and drunk, but not all were merry. Hanging over some of them was the shadow of the "Zero Hour." Some of them had to "go over the top." He was one of those, and it was worrying him. However, to come to the subject in hand, it was gratifying that this year the R.A.F., the Air Ministry and the A.I.D. were celebrating their 10th birthday. They were suffering from the "crime of being young," but there was comfort in the reflection that the man to whom the saying about the crime of being young was applied, Wm. Pitt the younger, was a pilot who weathered the storm.

Mr. McAnally humorously referred to a well-known M.P., who had the courage to get up in the House and suggest as a means of economy the abolition of all pre-war departments! Naturally, by making such a statement he put his head on the political block, but was it not a fact that that was just the time when one might expect a man to speak the truth? Those in the Air Ministry had outside contacts which made and kept them young. They had contact with science and with some of the most brilliant minds. They had contact with a great industry. The thought occurred to him that if one could imagine going back to war-time conditions and the enemy should have taken it into his head to drop a bomb (properly inspected, of course)! on the assembly, it would pretty well have destroyed British aviation. To conclude, he would desire to give a succinct description of Mr. Gilmore, and that description was "One of the best" (Applause.) He hoped Mr. Gilmore would have a happy and prosperous future in the world.

Mr. C. R. Fairey referred to the good feeling that now existed between the industry and the A.I.D., recalling that this had not always been the case. He could recall an A.I.D. inspector at his works (who had now left the A.I.D.), about whom it used to be said that when he died (as they fervently hoped) and went to Heaven (as they very much doubted), he would certainly reject the golden wings! As regards the work of the A.I.D., there could be no better testimonial than the fact that they stood in the highest popularity. The industry and the A.I.D. had much in common. Both worked hard to safeguard the lives of our pilots. In the press (not their own press, but the daily) they heard much about accidents. They heard nothing of the number of miles flown per accident, or about the way in which flying was getting safer every day. Still less, that the proportion of crashes due to failure of material was microscopic. That was in a large measure due to the work of the A.I.D., and between them the A.I.D. and the British aircraft industry could, he

felt sure, set standards well above those of the C.I.N.A. Major G. P. Bulman, O.B.E., proposed "The T.S.A.," and Mr. L. W. Warner, A.M.I.A.E., responded, both making very witty speeches, but as the subject was of a rather "domestic" nature, it is not thought necessary to publish a report here.

During the evening music was provided by Signor Bonefacio's orchestra, and intervals were enlivened by Clapham and Dwyer, Miss Emmie Joyce, and Mr. Lionel King, the latter's game of "Nap," with Sir John Higgins, Mr. McAnally and Mr. Gilmore holding the "hands," being particularly appreciated.

The proceedings concluded with "Auld Lang Syne," and once more the A.I.D. Annual Dinner could be written down an unqualified success.

THE ROYAL AIR FORCE

London Gazette, April 17, 1928

General Duties Branch

The following Pilot Officers are promoted to rank of Flying Officer (Jan. 30): W. G. Abrams, C. F. Chilton, R. S. Darbishire.

Air Vice Marshal Charles L. Lambe, C.B., C.M.G., D.S.O., is placed on half-pay list, Scale A, April 1 to May 13, 1928, inclusive. Flying Officer E. J. Spearing is placed on retired list (April 18). Flying Officer R. H. Bibby is transferred to Reserve, Class C (April 15). Pilot Officer G. N. Hoar relinquishes his short service commission on account of ill-health (April 16).

Gazette, March 27, regarding Flying Officer R. B. Fleming is cancelled.

Medical Branch

The following Flying Officers are promoted to rank of Flight-Lieut. (April 4):—R. J. I. Bell, R. G. Freeman.

RESERVE OF AIR FORCE OFFICERS

General Duties Branch

J. M. Longley is granted a commission in Class A.A. as a Pilot Officer on probation (April 2). The following Pilot Officers on probation are confirmed in rank:—J. D. Williamson (March 19), O. F. MacLaren (March 21).

Flying Officer F. G. Sinclair is transferred from Class C to Class A (March 30): Flying Officer R. T. Halliwell is transferred from Class A to Class C (April 10).

The following relinquish their commissions on completion of service:—Flying Officer E. H. Bird (Dec. 16, 1927), Pilot Officer T. N. Drake (April 1).

Princess Mary's R.A.F. Nursing Service

Sister Miss Isabelle D. Mardon resigns her appointment (Mar. 6).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Air Commodore I. M. Bonham-Carter, C.B., O.B.E., to H.Q., Halton, on appointment as Air Officer Commanding, 1.4.28.

Group Captain C. R. S. Bradley, O.B.E., to Special Duty List, on appointment as Air Attaché, Rome, 30.3.28.

Wing Commanders: G. R. Bromet, D.S.O., O.B.E., to Marine Aircraft Experimental Estab., Felixstowe, pending taking over command, 16.4.28. J. N. Fletcher, A.F.C., to R.A.F. Depot, Uxbridge, 30.3.28.

Squadron Leaders: G. F. Breese, D.S.C., to R.A.F. Training Base, Leuchars, 16.4.28. G. C. Bailey, D.S.O., to Air Ministry, Directorate of Equipment, 15.5.28. S. R. Watkins, A.F.C., to H.M.S. *Courageous* 21.2.28.

Flight Lieutenants: J. F. Lawson, A.F.C., to H.Q., Inland Area, Stanmore, 13.4.28. E. P. M. Davis, A.F.C., A.M., to No. 7 Sqdn., Worthy Down, 15.4.28. G. C. O'Donnell, D.F.C., to R.A.F. Depot, Uxbridge, 2.4.28. D. C. Prance, to Electrical and Wireless Sch., Flowerdown, 5.4.28. C. Porri, D. E. Ward and D. H. Carey, to H Q., Coastal Area, 1.2.28. W. H. Golder, D.S.M. to H.Q., Coastal Area, 15.5.28. N. H. Jenkins, O.B.E., D.F.C., D.S.M., to No. 84 Sqdn., Iraq, 8.3.28. C. G. Halliday, to Aircraft Depot, Iraq, 9.3.28. G. H. Smith, to No. 30 Sqdn., Iraq, 8.3.28. D. Drover, to H.M.S. *Courageous*, 11.4.28. E. T. Carpenter, A.F.C., and A. W. Franklyn, M.C., to H.M.S. *Courageous*, 21.2.28. E. P. Mackay, to R.A.F. Depot, Uxbridge, 22.3.28. D. Colyer, D.F.C., to No. 4 Flying Training Sch., Egypt, 5.4.28. G. O. Venn, to Aircraft Depot, India, 18.3.28. A. C. B. Harrison, M.C., to H.Q., R.A.F., India, 20.3.28. F. J. Fogarty, D.F.C., to No. 84 Sqdn., Iraq, instead of to No. 30 Sqdn., Iraq, as previously notified, 23.2.28. R. G. P. Ovenden, to H.Q., R.A.F., Middle East, 5.4.28. W. J. M. Akerman, to No. 31 Sqdn., India, 23.3.28. S. D. Macdonald, D.F.C., to Central Flying Sch., Wittering, 24.4.28.

AIR MINISTRY NOTICES TO AIRMEN

IT is notified that the index dated October 15, 1927, is cancelled and a new one substituted therefor:—

1.—*Cancelled Notices*

The Notices to Airmen enumerated in the list are cancelled. This list includes:—

(*a*) Notices which are cancelled through incorporation in the *Air Pilot* or *Air Pilot Monthly* Supplements (indicated by an asterisk, thus *).

(*b*) Notices notified as cancelled previously or which need no longer be retained.

Note.—Among the Notices in Class (*b*) are certain Notices which were issued to call attention to Orders in Council. The cancellation of such Notices in no way affects the Orders in force.

2.—*Operative Notices*

Notices to Airmen relating to Great Britain and Foreign Countries remaining operative until further notice are detailed.

To facilitate reference an indication of the principal contents of a Notice is given if this is not made clear by the title. If part of a Notice has been cancelled this also is indicated.

[Index, April 14, 1928.]

PERSONALS

Married

JOHN EDWARD RUDKIN SOWMAN (Flying Officer, R.A.F.), eldest son of Mr. and Mrs. A. W. R. Sowman, Olney, Bucks, was married, on April 11, at St. Matthew's Church, Northampton, to OLIVE ROSA TRIMMER, only daughter of Mr. W. J. Trimmer, Northampton.

FLIGHT-LIEUT. EDWARD ARTHUR BLAKE, R.A.F., Sealand, was married, on April 11. at St. Peter's, Frimley, to DOROTHY ELLA, daughter of Mrs. H. B. COTTLE, of South Kensington.

On April 11, FLIGHT-LIEUT. ARTHUR JOHN ELLIOTT, R.A.F., was married to MOLLY LOUISE, elder daughter of Mr. and Mrs. W. E. LOE, Farnham.

The marriage took place on April 10, of MAJ. RUPERT ERNEST PENNY, O.B.E., of the Air Ministry (late R.A.F.), second son of the late Mr. Edmund Penny, C.I.E., and of Mrs. Penny, 1a, Wetherby Terrace, S.W.5, to THELMA, second daughter of Mr. JAMES CHADWICK, of New York, and Mrs. Chadwick, of Sundridge Park Mansions, Bromley.

SQDN.-LDR. JOHN KILNER WELLS, A.F.C., R.A.F., was married, at Nice, on March 26, to ELIZABETH DALWAY, youngest daughter of the late ROBERT EVANS YOUNG, of Ottawa.

FLIGHT-LIEUT. CUTHBERT JOSEPH STANLEY DEARLOVE, R.A.F., son of Mr. and Mrs. G. A. Dearlove, of Cardiff, was married on April 18, at the Brompton Oratory, to CHRISTINE MARIAN, only daughter of Mr. and Mrs. PERCY J. GARRATT, of Newtown, Newbury, and Crackington Haven, N. Cornwall.

SQUADRON-LEADER R. S. BOOTH, A.F.C., R.A.F., younger son of the late Rev. J. W. W. Booth, of Prestwood, Bucks, and Mrs. Booth, of Banbury Road, Oxford, was married on April 23, at St. George's, Hanover Square, to LILY, only daughter of Mr. E. J. TAYLOR, of Forest Hill.

The marriage of JOHN, younger son of Col. G. D. ARMOUR, of Malmesbury, Wiltshire, and of the late Mrs. Emma Denholm Armour, and MARGARET, only daughter of Mrs. PATTERSON, of Ashton Keynes, Wiltshire, and of the late Mr. T. S. E. Mills, took place, very quietly, in Bristol on Saturday, April 21.

PUBLICATIONS RECEIVED

Air Estimates for the Year 1928. H.M. Stationery Office, Kingsway, London, W.C.2. Price 4*s*. 6*d*. net.

The Evolution of the Aeroplane. Handley Page, Ltd., Cricklewood, London, N.W.2.

Learn to Fly. The Yorkshire Aeroplane Club, Ltd., Sherburn-in-Elmet, Yorks.

AERONAUTICAL PATENT SPECIFICATIONS

(*Abbreviations*: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

APPLIED FOR IN 1926

Published April 26, 1928

32,727. J. L. BRUNTON and BRUNTON BROS., LTD. Control apparatus for aircraft. (287,960.)

APPLIED FOR IN 1927

Published April 26, 1928

9,322. SIR W. G. ARMSTRONG WHITWORTH AIRCRAFT, LTD., F. M. GREEN and J. LLOYD. Supporting surfaces of aircraft. (288,027.)

25,277. R. GALLI and G. R. BRIQUET. Automatic releasing device for parachutes. (278,695.)

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